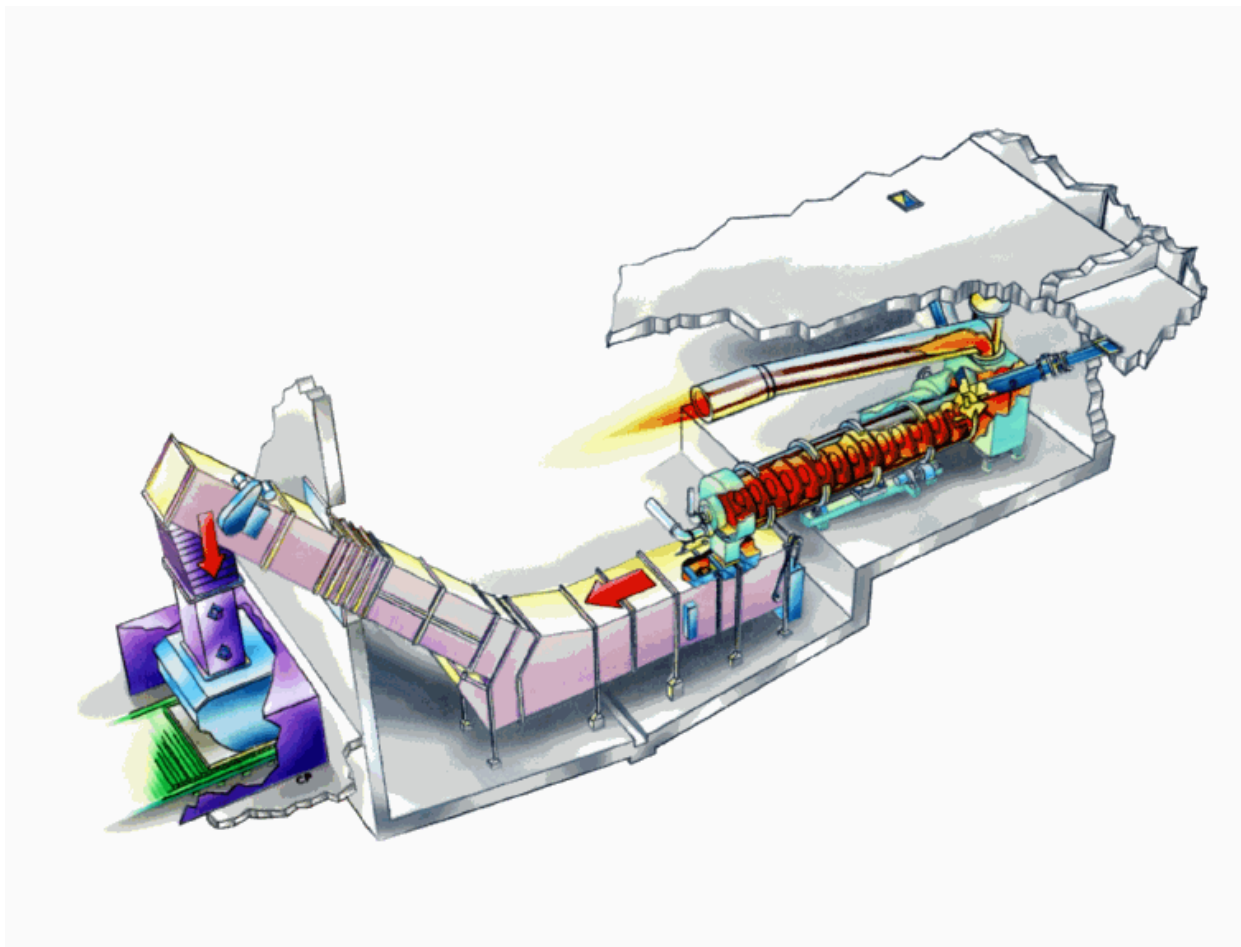


TOOELE CHEMICAL AGENT DISPOSAL FACILITY (TOCDF)



COMPREHENSIVE PERFORMANCE TEST PLAN FOR THE DEACTIVATION FURNACE SYSTEM

Revision 0

EG&G DEFENSE MATERIALS, INC.

December 3, 2008

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FACILITY
(TOCDF)**

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EXECUTIVE SUMMARY

The Tooele Chemical Agent Disposal Facility (TOCDF) was designed and built for the United States (U.S.) Army to destroy the chemical agent munitions stockpile at the Deseret Chemical Depot (DCD), located 20 miles south of Tooele, Utah. EG&G Defense Materials, Inc., (EG&G) operates the TOCDF under contract to the Army through the Chemical Materials Agency (CMA).

The U.S. Environmental Protection Agency (EPA) identification number for the TOCDF is UT5210090002. The facility operates under a Resource Conservation and Recovery Act (RCRA) Part B Permit, issued pursuant to the delegation of the State of Utah, Department of Environmental Quality (DEQ), Division of Solid and Hazardous Waste, under the Utah Administrative Code, Section 315. In addition, the TOCDF also operates under a Title V Permit administered by the DEQ, Division of Air Quality (DAQ). Under the requirements of these permits, the incinerator system must demonstrate the ability to effectively treat any hazardous wastes such that human health and the environment are protected.

This plan addresses the conduct of a Comprehensive Performance Test (CPT) in the DFS to fulfill the CPT requirements found in the Maximum Achievable Control Technology (MACT) regulations to conduct testing every 61 months and the Title V Permit requirement for selected testing every five years. Data requirements will be met by collecting a complete set of process data to document system performance and a set of samples to characterize the emissions from the DFS and demonstrate these emissions meet the MACT emission limits.

The TOCDF DFS CPT will consist of one test condition under which fuzes and bursters from 4.2-inch Mortars will be processed. This CPT will demonstrate temperatures in the kiln and the afterburner in the operating window that was established during the DFS VX Agent Trial Burn (DFS VX ATB). This CPT is a demonstration of compliance with the established operating conditions rather than to establish new operating conditions, with the exception of the pH of the Brine and the clean liquor solution. The pH of these solutions was changed through a Class 3 permit modification and will be demonstrated in this CPT. EG&G will conduct the CPT, a subcontractor will conduct sampling activities, and a subcontracted laboratory will analyze the collected samples. EG&G will prepare a final report that summarizes the CPT operating conditions and emissions.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACAMS	Automatic Continuous Air Monitoring System
ACS	Agent Collection System
ADAFD	ACAMS Dilution Air Flow Controller
AFB	Afterburner
AMR	Alternate Monitoring Request
ATB	Agent Trial Burn
AWFCO	Automatic Waste Feed Cutoff
BLAD	Blast Load Attenuation Duct
BMS	Burner Management System
BRA	Brine Reduction Area
Brine	Wet Scrubber Recirculation Brine
CAL	Chemical Assessment Laboratory
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
CHB	Container Handling Building
CMA	Chemical Materials Agency
CPT	Comprehensive Performance Test
CRO	Control Room Operator
DAAMS	Depot Area Air Monitoring System
DAQ	State of Utah, Department of Environmental Quality, Division of Air Quality
DCD	Deseret Chemical Depot
DDAFD	DAAMS Dilution Air Flow Controller
DEQ	State of Utah, Department of Environmental Quality
DFS	Deactivation Furnace System
DFS Duct	Sampling location on the duct between ID fan and common stack
DRE	Destruction and Removal Efficiency
ECR	Explosive Containment Room
EG&G	EG&G Defense Materials, Inc.
EPA	U.S. Environmental Protection Agency
GC/FPD	Gas Chromatograph/Flame Photometric Detector
HDC	Heated Discharge Conveyor
HHRA	Human Health Risk Assessment
HRA	Hourly Rolling Average
HWC	Hazardous Waste Combustors
ID	Induced Draft
JACADS	Johnston Atoll Chemical Agent Disposal System

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LIST OF ACRONYMS AND ABBREVIATIONS (continued)

kiln	Rotary Kiln Primary Combustion Chamber
LIC	Liquid Incinerator
LOQ	Limit of Quantitation
MACT	Maximum Achievable Control Technology
MDB	Munitions Demilitarization Building
MPF	Metal Parts Furnace
NCRS	Nose Closure Removal Station
NDIR	Non-Dispersive Infrared
NFPA	National Fire Protection Association
ONC	On-Site Container
PAS	Pollution Abatement System
PDARS	Process Data Acquisition and Recording System
PEP	Propellant, Explosive, and Pyrotechnics
PFS	PAS Filtration System
PIC	Products of Incomplete Combustion
PLC	Programmable Logic Controller
PM	Particulate Matter
PMD	Projectile/Mortar Disassembly Machine
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QP	Quality Plant Sample
RCRA	Resource Conservation and Recovery Act
SCC	Secondary Combustion Chamber
SDS	Spent Decontamination System
SEL	Source Emission Limit
spent decon	Spent Decontamination Solution
STEL	Short Term Exposure Limit
SW-846	Test Methods for Evaluating Solid Waste, 3rd Edition including Update III, USEPA, SW-846, December 1996.
TE-LOP	Tooele Laboratory Operating Procedure
TEQ	Toxic Equivalent Concentration
TOCDF	Tooele Chemical Agent Disposal Facility
TSDF	Treatment Storage and Disposal Facility
UPA	Unpack Area
UPS	Uninterruptible Power Supply
U.S.	United States
WAP	Waste Analysis Plan

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LISTS OF UNITS AND MEASUREMENTS

acfm	Actual Cubic Feet per Minute
Btu/hr	British Thermal Units per hour
Btu/lb	British Thermal Units per pound
°C	Degree Centigrade
°F	Degree Fahrenheit
dscf	Dry Standard Cubic Feet
dscfm	Dry Standard Cubic Feet per Minute
dscm	Dry Standard Cubic Meter
ft	Foot or Feet
g	Gram
g/sec	Grams per Second
gal	Gallon
gpm	Gallons per Minute
gr/dscf	Grains per Dry Standard Cubic Foot (1 atm, 68 °F)
hp	Horsepower
inHg	Inches of Mercury
inWC	Inches of Water Column
L	Liter
L/m	Liters per Minute
μg	Microgram
m ³	Cubic Meter
mg	Milligram
mL	Milliliters
mm	Millimeter
<u>N</u>	Normal
ng	Nanograms
ppb	Parts Per Billion
ppm	Parts per Million
ppmdv	Parts per Million on a Dry Volume Basis
ppt	Parts Per Trillion
lb/hr	Pounds per Hour
psig	Pounds Per Square Inch Gauge
rpm	Revolutions per Minute
ΔP	Pitot Velocity Pressure

LIST OF CHEMICAL SYMBOLS AND FORMULAS

Al	Aluminum
Ag	Silver
As	Arsenic
B	Boron
Ba	Barium
Be	Beryllium
Cd	Cadmium
Cl ⁻	Chloride
Cl ₂	Chlorine
CO ₂	Carbon Dioxide
CO	Carbon Monoxide
Co	Cobalt
Cr	Chromium
Cu	Copper
HNO ₃	Nitric Acid
Hg	Mercury
HCl	Hydrogen Chloride
H	Levinstein mustard
HD	distilled mustard
HT	Mixture of <i>bis</i> (2-chloroethyl) sulfide and <i>bis</i> [2-(2-chloroethylthio)ethyl] ether
H ₂ O ₂	Hydrogen Peroxide
KMnO ₄	Potassium Permanganate
Mn	Manganese
mustard	<i>bis</i> (2-chloroethyl)sulfide
NaOCl	Sodium Hypochlorite
NaOH	Sodium Hydroxide
H ₂ SO ₄	Sulfuric Acid
Ni	Nickel
NO _x	Nitrogen Oxides
O ₂	Oxygen
P	Phosphorus

LIST OF CHEMICAL SYMBOLS AND FORMULAS (Continued)

Pb	Lead
PCDD	Polychlorinated Dibenzo-p-dioxin
PCDF	Polychlorinated Dibenzofurans
Sb	Antimony
Se	Selenium
SO ₂	Sulfur Dioxide
Sn	Tin
TCDD	Tetrachlorodibenzo-p-dioxins
TCDF	Tetrachlorodibenzofurans
Tetryl	2,4,6-Trinitrophenyl-N-methylnitramine
Tl	Thallium
TNT	Trinitrotoluene
V	Vanadium
Zn	Zinc

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LIST OF IDENTIFICATION CODES FOR DFS INSTRUMENTS MONITORING REGULATED OPERATING PARAMETERS

16-TIT-182 ^a	Kiln Pre-Quench Exhaust Gas Temperature
16-TIT-008 ^b	Kiln Post-Quench Exhaust Gas Temperature
16-TIT-042 ^b	Heated Discharge Conveyor Temperature (bottom)
16-TIT-184 ^b	Heated Discharge Conveyor Temperature (top)
16-ZS-602 ^b	Kiln Rotational Speed
16-PIT-018 ^c	Kiln Pressure Relative to DFS Room
16-PSHH-204 ^a	Kiln Pressure High-High
16-TIT-092 ^a	Afterburner Exhaust Gas Temperature
24-TIT-374 ^c	Quench Tower Exhaust Gas Temperature
24-TSHH-001 ^b	Quench Tower Exhaust Gas Temperature High-High
24-PDIT-008 ^a	Venturi Scrubber Pressure Drop
24-FIT-006 ^a	Venturi Scrubber Brine Feed
24-PIT-011 ^b	Quench Brine Delivery Pressure
24-FIT-030 ^a	Scrubber Tower Clean Liquor Feed
24-PIT-036 ^a	Scrubber Tower Clean Liquor Delivery Pressure
24-AIT-007 ^a	Scrubber Brine pH
24-DIT-033 ^a	Scrubber Brine Purge Density
16-AIT-059 ^a	Exhaust Gas CO, 60-min rolling average corrected to 7% O ₂
24-AIT-207 ^a	Exhaust Gas CO, 60-min rolling average corrected to 7% O ₂
24-AIT-206 ^b	Exhaust Gas O ₂
16-AIT-175 ^b	Exhaust Gas O ₂
24-AIT-034 ^d	Clean Liquor pH
24-FIT-9430 ^a	Exhaust Gas Flow Rate
24-PIT-9430 ^c	V-Cone Pressure
24-TIT-9430 ^c	V-Cone Temperature
24-DIT-035 ^d	Clean Liquor Density
24-PDIT-025 ^d	Packed Bed Scrubber Differential Pressure

^a Required by TOCDF RCRA Permit and HWC MACT Regulations

^b Required by TOCDF RCRA Permit

^c RCRA Monitoring Instrument (no AWFCO)

^d Required by HWC MACT Regulations

1.0 INTRODUCTION

The Tooele Chemical Agent Disposal Facility (TOCDF) is a hazardous waste disposal facility that was designed and built for the United States (U.S.) Army to destroy the chemical agent munitions stockpile at the Deseret Chemical Depot (DCD), located 20 miles south of Tooele, Utah. The TOCDF is designed to dispose of chemical Agents GB, VX, and mustard (H-series), drained munitions, contaminated refuse, bulk containers, liquid wastes, explosives, and propellant components. EG&G Defense Materials, Inc., (EG&G) operates the TOCDF under contract to the U.S. Army through the Chemical Materials Agency (CMA). The TOCDF operates four incinerator systems to dispose of the chemical agents stored at DCD. These incinerators include the two Liquid Incinerators (LIC1 and LIC2), the Metal Parts Furnace (MPF), and the Deactivation Furnace System (DFS).

The U.S. Environmental Protection Agency (EPA) identification number for the TOCDF is UT5210090002. The facility operates under a Resource Conservation and Recovery Act (RCRA) Part B Permit, issued pursuant to the delegation of the State of Utah, Department of Environmental Quality (DEQ), Division of Solid and Hazardous Waste, under the Utah Administrative Code, Section 315 (R315). The TOCDF also operates under a Title V Permit administered by the DEQ, Division of Air Quality (DAQ). These permits require that the incinerators demonstrate the ability to effectively treat any hazardous waste such that human health and the environment are protected; this ability was demonstrated in a combined Agent Trial Burn (ATB) to meet the RCRA requirements, and a Comprehensive Performance Test (CPT) to meet the Title V and Hazardous Waste Combustors (HWC) Maximum Achievable Control Technology (MACT) requirements. Those tests were conducted simultaneously in a July 2003 ATB by processing Agent VX M55 rockets and M56 Warheads through the DFS. That ATB is referred to as the DFS VX ATB.

The data from the DFS VX ATB was submitted as data in lieu, which started the 5-year testing cycle. The Title 40, Code of Federal Regulations, Part 63, Subpart EEE (40 CFR 63, Subpart EEE), requires that a CPT be conducted every 61 months and there is a requirement in the Title V Permit to conduct selected testing every five years, which would have been July 2008; however, the DFS was not in operation at that time, but will be started up again in February 2009, which is when TOCDF plans to conduct the required CPT. The TOCDF requested an extension from DAQ to the testing schedule in June 2008, to allow the delay in the DFS CPT until first quarter of 2009. This DFS CPT Plan serves as notification of intent to conduct a CPT for the DFS.

This plan describes how TOCDF will conduct the DFS CPT using sampling and analysis methods from SW-846 (1); 40 CFR 60, Appendix A (2); and TOCDF Laboratory Operating Procedures (TE-LOPs).

A separate Continuous Emissions Monitoring System (CEMS) performance evaluation per 40 CFR 60, Appendix B, is conducted annually as directed in Attachment 20 to the TOCDF RCRA Permit (3). The DFS CPT Plan was developed using the EPA guidance (4). Regulatory citations are given, as appropriate, throughout the plan.

1.1 DFS CPT PLAN ORGANIZATION

This plan is a stand-alone document to allow review separate from the TOCDF permits. The plan describes the operating conditions for the testing and the samples to be collected as part of the DFS CPT. The Quality Assurance Project Plan (QAPP) describes the sampling and analyses to be conducted and is found in Appendix A. Appendix B summarizes the Automatic Waste Feed Cutoffs (AWFCOs) and the letter justifying the removal of selected AWFCOs through an Alternate Monitoring Request (AMR).

This introduction provides an overview of the plan, including:

- Process descriptions;
- Waste feed descriptions;
- CPT objectives;
- CPT approach;
- CPT program; and
- CPT protocol.

1.2 WASTE TREATMENT SYSTEM PROCESS AND FEED DESCRIPTIONS

The TOCDF is designed to operate as an integrated plant with all incinerators in concurrent operation. Different munitions and bulk items require the operation of various combinations of incinerators. Feed for the DFS CPT will consist of fuzes and bursters removed from 4.2-inch HT Mortars filled with two mustard compounds; *bis*(2-chloroethyl) sulfide (H) and *bis*[2-(2-chloroethylthio) ethyl] ether (T). These mortars are referred to as HT mortars, and the 4.2-inch Mortars filled with distilled mustard (HD) will not be processed until the PAS Filtration Systems (PFS) are in use on the LICs and the MPF.

During burster processing, no significant quantities of HT will be fed to the DFS, so although mustard emissions will be monitored, a Destruction and Removal Efficiency (DRE) will not be calculated. A well-documented DRE was established during the DFS VX ATB, which used

Agent VX M55 Rockets and M56 Warheads as feed to the DFS. Therefore, it is not necessary to determine another DRE during the DFS CPT. Explosives used during the CPT will be from 4.2-inch HT Mortar fuzes and bursters. The explosive emissions and DRE will not be determined since these data were established during the DFS VX ATB.

The incineration process includes a rotary kiln primary combustion chamber (kiln) followed by an afterburner (AFB). Located between the kiln and AFB are a Blast Load Attenuation Duct (BLAD), cyclone, and isolation valve. Exhaust gas from the AFB is routed to the Pollution Abatement System (PAS), which includes a quench tower, a high-energy venturi scrubber, a low-energy packed bed scrubber, a demister, and an induced draft (ID) fan. Brief descriptions of the major discrete components follow, and a more detailed description of the system is provided in Section 2.

Although the LICs and MPF may process during DFS CPT runs, this plan covers only the DFS and its associated PAS. The descriptions of the waste handling and storage systems contained herein are provided to facilitate an understanding of their configuration relative to the balance of the waste treatment system.

1.2.1 Waste Handling and Storage

The chemical munitions are stored in DCD Area 10 until transported to the TOCDF for processing. Munitions and ton containers are moved from Area 10 in On-Site Containers (ONCs) to the TOCDF Container Handling Building (CHB). The ONCs are stored in the CHB until moved into the Munitions Demilitarization Building (MDB) where the munitions and bulk containers are removed from the ONCs and processed. The agent removed from munitions and storage containers is pumped to the carbon steel Agent Collection System (ACS) Tanks. The energetic components removed from 4.2-inch HT Mortars are processed in the DFS, and any agent remaining in the mortars is destroyed in the MPF. Waste residues resulting from DFS operations are disposed of at a Subtitle C Treatment Storage and Disposal Facility (TSDF); MPF-treated mortars are either sent off-site to be recycled or landfilled.

The facility also generates spent decontamination solution (spent decon) during the demilitarization processes. The spent decon is captured in MDB sumps and pumped to one of three Spent Decontamination System (SDS) tanks for processing in a LIC secondary combustion chamber (SCC). The SDS tanks are 2,300-gallon vertical, polyvinyl chloride lined, carbon steel tanks. After being filled with spent decon, the content of each tank is sampled for mustard. If the sample meets the treatment criteria, the spent decon is pumped through a spray nozzle in the top of the LIC SCC.

The PAS removes acid gases from the exhaust gas that is generated during combustion. The Wet Scrubber Recirculation Brine (Brine) removes the acid gases and neutralizes the acidic compounds. Used Brine is stored in tanks until it is shipped off-site for disposal.

1.2.2 Combustion Process

The DFS was custom designed based on an existing model at the Johnston Atoll Chemical Agent Disposal System (JACADS) and, hence, has no model designation. The kiln is 5 feet (ft) one inch in diameter (outside shell) by 32.9 feet long. The kiln burner is rated for a maximum of 8 million British Thermal Units per hour (Btu/hr) and the kiln can accommodate an additional 8.5 million Btu/hr from the waste feed. An ID fan draws the combustion gases from the kiln to the AFB.

The AFB is a vertical, refractory-lined, cylindrical chamber that is 44.0 ft high with a 9.25-ft diameter, and houses two natural-gas-fired burners located at the top of the chamber. The AFB is rated at 16 million Btu/hr per burner or 32 million Btu/hr for the two burners. It is designed to provide a minimum gas residence time of two seconds. Modulating the burner-firing rate controls the AFB temperature. The AFB provides complete thermal destruction of any organic compounds in the exhaust gas.

1.2.3 Pollution Abatement System

The PAS is designed to remove acid gases, particulate matter (PM), and metals from the combustion gas prior to discharge to the atmosphere. The PAS consists of a quench tower, high-energy venturi scrubber, packed bed scrubber, demister, and ID fan. Exhaust gases travel from the AFB to the quench tower where they travel through a series of brine sprays that cool the gases by evaporating water. The quench tower is an up-flow design with a diameter of 10.5 ft and a height of 40 ft. Under normal operating conditions, a liquid to gas ratio of 230 gallons per minute (gpm) to about 12,000 dry standard cubic feet per minute (dscfm) is maintained. The quench tower was designed for a maximum inlet temperature of 2,350 °F and a maximum outlet temperature 225 °F.

Exhaust gases pass from the quench tower through the high-energy venturi scrubber where high-pressure Brine sprays create small droplets for efficient capture of small PM. Acid gases are absorbed by the Brine and neutralized by the caustic in the Brine. For this test, the venturi will operate in the range of 20 to 50 inches of water column (inWC) when the system is processing hazardous waste. The exit from the venturi scrubber leads to a 90° vertical-to-horizontal elbow in the ductwork. The high velocity of the exhaust gases combined with the change of direction in flow removes the PM from the gases.

The scrubber tower is a Hastelloy® vessel, 9 ft in diameter and 40 ft high. Effluent from the venturi scrubber enters the scrubber tower where the liquid falls to the tower reservoir and the gas rises through the chimneys of the clean liquor tray. The clean liquor is controlled to a pH greater than or equal to (\geq) 7 by the addition of 18 % sodium hydroxide. Exhaust gases are scrubbed by the clean liquor, which removes PM and neutralizes any remaining acid gases. Finally, the gases pass through a mist eliminator as they exit the scrubber tower.

Exhaust gases travel from the scrubber tower to the demister, which is a fiberglass vessel 13 ft in diameter and 33 ft high. Gases flow through demister candles that remove entrained solids and liquid droplets. Solids are trapped on the candles, and liquids drain to the vessel bottom where they are then pumped to the scrubber reservoir.

A two-stage blower ID fan maintains the DFS and associated PAS at a negative pressure to prevent fugitive emissions. The kiln is maintained typically at > 0.5 inWC vacuum relative to the DFS furnace room. An emergency ID fan will operate in the event power to the system is lost.

1.2.4 Wet Scrubber Recirculation Brine Treatment

The scrubber tower reservoir receives all Brine drainage from the PAS components. Brine density controls the discharge of Brine from the reservoir. As Brine is discharged to holding tanks upon the specific gravity reaching setpoint, process water is introduced to the reservoir to maintain the liquid volume. Brine is pumped to one of four waste holding tanks for storage prior to off-site disposal. The Brine pH is normally > 7.0 , with total dissolved solids typically about 100,000 parts per million (ppm) and total suspended solids typically about 800 ppm.

1.3 WASTES TO BE TREATED

The U.S. Army has built the TOCDF to safely destroy the chemical agent stockpile at the DCD. The stockpile was comprised of munitions and bulk storage containers of Agents GB, VX, and H-series mustard, but now only the fuzes and bursters from mortars remain to be treated in the DFS. The Chemical Weapons Convention directs that the mustard and associated munitions be destroyed and that the energetic components burned in the DFS not be: reusable, marketable, or economically recoverable. The DFS provides the U.S. Army with the most economical and safe method of destruction for these discarded military items.

The State of Utah has defined mustard as acutely hazardous and identified it as a P999 waste. The same identification is applied to anything contaminated by mustard. No mustard is fed to the DFS because the burster well separates the fuze assembly and burster casing (both contain energetics) from the mustard. The main energetic compound in the fuzes and bursters is 2,4,6-trinitrophenyl-N-methylnitramine (tetryl). While the fuze and burster are processed in the DFS, the burster well and drained mortars are treated in the MPF. The TOCDF does not treat any waste materials with dioxin waste codes F020, F021, F022, F023, F026, or F027.

The wastes to be treated in the DFS are the fuzes and bursters removed from the 4.2-inch HT Mortars and the Explosive Containment Room (ECR) maintenance residues. The ECR maintenance residues consist of:

- Explosive and reactive residues,
- Explosive contaminated materials (e.g., rags and absorbent pads),
- ECR sump strainers and residues,
- Cotton goods (e.g., coveralls and mop heads),
- Bags, burlap, and plastic,
- Unserviceable hand tools, and metal hardware, and
- Hydraulic Fluid.

Residues resulting from DFS operations include cyclone ash, Heated Discharge Conveyor (HDC) residues, and Brine. The DFS treatment residues will be collected and shipped off-site for disposal at a Subtitle C TSDF. The Utah waste code will be assigned to any wastes derived from the treatment of chemical agent munitions (F999) in addition to the pertinent RCRA waste codes.

1.4 CPT OBJECTIVES

The objectives for the TOCDF DFS CPT are to demonstrate that:

- CO emissions are controlled to:
 - Less than ($<$) 100 parts per million dry volume (ppmdv), corrected to 7 % O₂ (@ 7 % O₂), on an Hourly Rolling Average (HRA) basis to meet the Title V Permit and MACT requirements; and
 - $<$ 4.84 pounds/hour (lb/hr) to meet the Title V Permit limit.
- PM emissions are:
 - $<$ 29.7 mg/dscm @ 7 % O₂ (MACT limit);
 - $<$ 0.02 grains/dscf @ 7 % O₂ (Title V Permit limit); and
 - $<$ 2.55 lb/hr (Title V Permit limit).
- Combined halogen emissions of hydrogen chloride (HCl) and chlorine (Cl₂) are $<$ 32 ppm expressed as HCl equivalents, dry basis @ 7 % O₂.
- Polychlorinated dibenzo-*p*-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF) emissions are $<$ 0.40 nanograms/dscm (ng/dscm) 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) Toxic Equivalent Concentration (TEQ) @ 7 % O₂.
- Metals emissions meet the MACT requirements.
- Emission rate of sulfur dioxide (SO₂) is below the Title V Permit limit of 1.0 lb/hr.
- Establish pH setpoints for Brine and clean liquor solutions.

1.5 CPT APPROACH

The CPT will use one set of permit conditions or limits for feed of energetic materials to the DFS, thereby demonstrating that the DFS meets the emission limits that were demonstrated during the DFS VX ATB with the exception of the pH of the Brine and the clean liquor solution. During the DFS CPT, the selected conditions demonstrate the average DFS operating conditions including kiln and AFB temperatures, which will demonstrate that the combustion process is still within specific limits (including temperature, combustion gas velocity, and thermal duty).

1.6 PROPOSED DFS CPT PROGRAM

During this CPT, the kiln and AFB exhaust gas temperatures will be maintained within the limits set by prior testing. These limits include:

- System pressures maintained at negative pressure relative to the DFS room.
- Operation of the PAS following the furnace; hence, fluctuations in PAS parameters are limited.
- Brine pH controlled at a $\text{pH} > 7$ to remove the acid gases from the exhaust gases. Brine flows are controlled principally to maintain component liquid levels and temperatures.

The DFS is operated as an intermittent batch feed incinerator; discrete batches of wastes (i.e., mortar fuzes/burster and ECR maintenance residues) are collected on feed gates and then dropped into the kiln. The feed gates can be rapidly cycled. Additionally, adjustable shrouds that run the length of the kiln direct DFS room air along the exterior surface of the kiln and into the kiln. This serves to both cool the kiln skin and pre-heat a portion of the air going into the kiln. Incinerator exhaust gas flow rates increase as the shrouds are opened, and are greatest when waste feed rates are maximized and shrouds are fully opened.

1.6.1 Worst Case Criteria Discussion

This CPT will not develop a “worst case” set of condition as did the DFS VX ATB. Rather, it will demonstrate the normal operating conditions for processing fuzes and bursters from 4.2-inch HT Mortars.

1.6.2 Proposed Test Operating Conditions

The kiln exhaust gas temperature will be relatively low when feeding mortar fuzes/bursters and ECR maintenance residues. Energetic compounds feed rates will be limited to the Propellant,

Explosive, and Pyrotechnics (PEP) feed rates demonstrated during the DFS VX ATB. The plant operating conditions will be within the normal operating envelope established by the DFS VX ATB. Samples collected will support those identified by the MACT regulations and Title V Permit. The AFB exhaust gas temperature will be held at $\geq 2,150$ °F. The residence time through the kiln and the AFB will be ≥ 2 seconds, but this will be controlled by monitoring the V-Cone™ measured velocity in the duct after the AFB. The O₂ concentration will be maintained between 3 % and 15 %. The CO concentration will be below 100 ppm @ 7% O₂ on an HRA basis.

1.7 CPT SAMPLING AND ANALYTICAL PROTOCOLS

Detailed discussions of the sampling and analysis procedures are provided in the QAPP in Appendix A. The structure of this CPT is based on the previously stated objectives in Section 1.4. The exhaust gas sampling and analytical methods to be used to quantify specific CPT parameters are taken from SW-846 (1), 40 CFR 60, Appendix A (2), and TOCDF procedures. The methods include:

- The Depot Area Air Monitoring System (DAAMS), which will monitor the exhaust gas in the duct (DFS Duct) between the ID fan and the common stack (TE-LOP-522 for sampling and TE-LOP-562 for analysis).
- The Automatic Continuous Air Monitoring System (ACAMS) monitoring the DFS Duct, which will provide a stop feed if mustard is present in the duct (TE-LOP-524).
- The TOCDF CO and O₂ CEMS, which will monitor on a continuous basis. The CO concentration will be used to demonstrate control of Products of Incomplete Combustion (PICs).
- EPA Methods 1 and 2 (2), which will determine the traverse sampling locations and flow rates.
- Isokinetic sampling trains, which will determine moisture content.
- EPA Method 6C (2), which will determine the SO₂ emissions with a CEMS supplied by the sampling subcontractor.
- EPA Method 5/26A (2), which will determine the DFS PM emissions and HCl/Cl₂ emissions.
- EPA Method 29, which will demonstrate that the metals emissions meet the MACT regulations.

- SW-846, Method 0023A (1), which will determine PCDD/PCDF concentrations meet the MACT regulations.

1.8 PERMIT LIMITS

This CPT will demonstrate the normal operating conditions that were established by the DFS VX ATB with the exception of the pH of the Brine and clean liquor solutions that were changed through a Class 3 Permit modification and demonstration in this CPT. Process parameters are divided into Group A, B, and C parameters as directed in the applicable EPA guidance documents. Group A and B parameters were established by the DFS VX ATB. Group C parameters were established on the basis of regulatory guidance, process design and safety considerations, or equipment manufacturers' recommendations. The operating limits are shown in Appendix B.

Group A parameters will be continuously-monitored process parameters, which will be tied to AWFCOs. Group B parameters do not require continuous monitoring and will not be interlocked with the AWFCO system. However, detailed operating records will be maintained to demonstrate compliance with permitted operating conditions. Some Group C parameters will be continuously monitored and interlocked with the AWFCO system.

Group C parameters were established independently from trial burn results. For the most part, their respective limits were based on engineering considerations and good operating practices. For safety and system performance purposes, the quench tower exit temperature, kiln rotational speed, and HDC temperatures will be monitored and recorded continuously, and interlocked with the AWFCO system.

During the shakedown period, the AWFCO settings for Group A and interlocked Group C parameters will be those listed in Appendix B. During the CPT, the interlocks for these Group A and C parameters will remain operational at the limits listed in Appendix B. Group B parameters will be monitored and recorded continuously during the CPT, but will not be interlocked with the AWFCO system.

The feed rate of fuzes and bursters will be well below the PEP established by the DFS VX ATB. None of the munition combinations in this CPT will result in higher metals emissions than processing M55 Rockets at the rate demonstrated by the DFS VX ATB. The TOCDF expects the CPT to validate the limits for mustard operations currently permitted by the RCRA and the Title V Permits.

2.0 DETAILED ENGINEERING DESCRIPTION OF THE DFS

This section of the plan discusses the requirements of 40 CFR 63, Subpart EEE to conduct a CPT. This section discusses the current engineering configuration of the TOCDF DFS as required by 40 CFR 270.62(b)(2)(ii). The operating parameters will be within those established by the DFS VX ATB, and only the pH of the Brine and clean liquor will be changed. Engineering changes may be encountered during shakedown that will necessitate revisions to this CPT plan, and any such changes will be coordinated with the DAQ.

The DFS is designed to treat the energetic compounds associated with 4.2-inch HT Mortars. The DFS consists of a kiln, an HDC, an AFB, a kiln combustion air blower, an AFB combustion air blower, a BLAD, a cyclone, an isolation valve, a PAS, and all associated instrumentation and piping. There is no model designation for the DFS because of the unique requirements and corresponding custom design. Figure 2-1 shows a simplified DFS process flow diagram.

2.1 ROTARY KILN PRIMARY COMBUSTION CHAMBER

The kiln, located in the DFS Room, is a steel alloy cylinder, 32 ft 10.5 inches long with a 5-ft 1-inch outside shell diameter, comprised of five sections bolted together. The kiln rotates on – and is supported by – trunnion rollers located in a stationary subassembly at each end for charging and discharging the kiln. An internal spiral baffle (i.e., flights) conveys material through the kiln. The charge-end subassembly of the kiln contains two feed chutes and the exhaust duct, while the discharge-end subassembly contains the kiln burner and the discharge chute. The exhaust gases flow countercurrent to the flow of waste in the kiln. The burner maintains the temperature

≥ 954 °F at the feed end of the kiln, and the temperature at the burner end can range as high as 1,650 °F. Kiln rotational speed ranges from 0.33 revolutions per minute (rpm) to 2.0 rpm. A rotational speed of 1.9 rpm yields 7 minutes of residence time in the kiln. The kiln was designed for a maximum mortar burster-processing rate of 274 per hour, which is approximately equal to a waste heat input of 8.5 million Btu/hr. The proposed DFS CPT waste feed rates are within the designed capacity of the system.

The kiln is completely enclosed by an insulated shroud. Drawing combustion air through the shroud cools the kiln shell and minimizes heat loss to the DFS Room as well as preheating the combustion air prior to it entering the kiln. Air is drawn into the shroud as a result of kiln negative pressure relative to room pressure. The airflow through the shroud is controlled by dampers at the shroud inlet ports, which are adjusted from the Control Room.

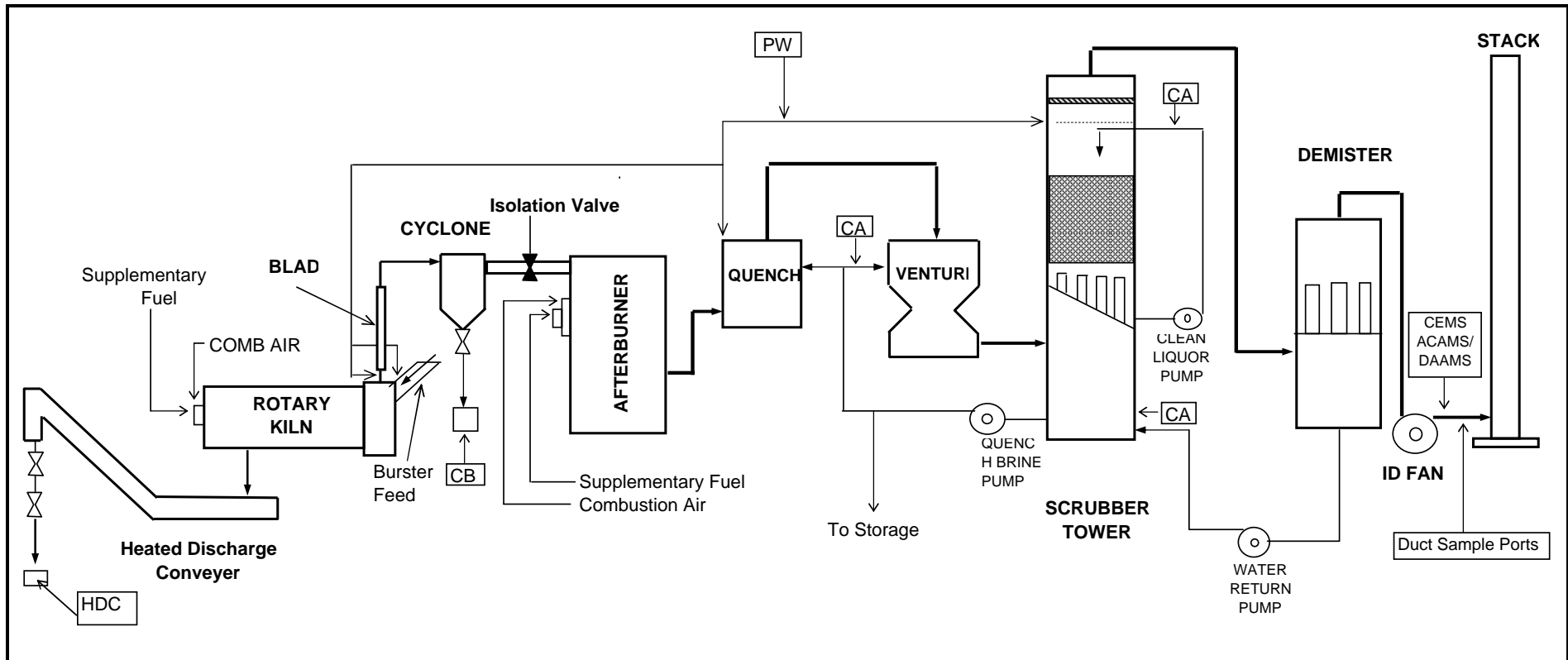


Figure 2-1. DFS Process Flow Diagram

Notes:

CA = NaOH Makeup Addition

PW = Process Water Lines

CB = Cyclone Residue Collection Bin

HDC = Heated Discharge Residue Collection Bin

The kiln is connected to the AFB by ductwork through the BLAD, cyclone, and isolation valve. Between the kiln and the BLAD, the exhaust gas is quenched with a water spray when the gas temperature exceeds 1,525 °F. Since the kiln processes energetics that could result in a small detonation, the exhaust duct leading from the kiln is equipped with a BLAD to prevent a blast shock wave from reaching the DFS PAS. The metal duct and the BLAD are designed to contain an explosive overpressure equivalent to 28.2 lb of trinitrotoluene (TNT). The BLAD is designed to reduce the overpressure to normal operating pressure downstream. The BLAD consists of a short section of duct that is wider than the rest, where several concentric baffle plates are mounted. The larger cross section of the BLAD, combined with the baffle plates, acts to dissipate any pressure wave from the kiln.

Following the BLAD, the gases enter a refractory-lined cyclone designed to separate larger particulates from the exhaust gas stream. The cyclone is a cylindrical vessel with a cone-shaped bottom. The gas inlet is a tangential inlet on the side near the top of the cyclone, and gases exit through the center of the top of the cyclone. This design causes the particulate matter entering the cyclone to spin, throwing the large particles and fiberglass strands into the walls via centrifugal force where friction slows them and causes them to fall to the conical bottom. A drop tube discharge from the cone-shaped bottom is provided to empty collected solids into a container. A slide gate is installed in the drop tube just above the container for sealing off the drop tube during container changes. The residue container and the bottom section of the cyclone are enclosed in a ventilated enclosure to prevent the release of fugitive emissions during container changeout.

An isolation valve (16-XV-862) is installed in the exhaust duct between the cyclone and the AFB that can be used during start-up and upset conditions to separate the kiln from the AFB. The isolation valve is closed during start-up to isolate the kiln until the temperature in the afterburner is $\geq 1,500$ °F. Once the AFB is at temperature, the valve is opened to allow startup of the kiln. During an upset condition, the isolation valve is closed when the temperature in the AFB drops below 1,500 °F. Closing this valve prevents emissions from the kiln to enter the AFB when the AFB temperature is too low to destroy organic compounds completely.

2.2 AFTERBURNER

The cylindrical, vertically-oriented AFB is 44.17 ft high with a 9.25-ft diameter, lined with refractory to minimize heat loss. The AFB cross-section area is approximately 67.2 ft², and the total volume is approximately 2,968 ft³. Exhaust gases go from the cyclone to the top of the AFB where the gases are heated by burners to a temperature of 2,000 °F, or higher. The heated gases exit the side of the AFB at the bottom. Combustion air and fuel gas enter the AFB through the burners. Thermocouples located near the exhaust gas outlet measure chamber temperature, and they modulate burner fuel and combustion air supply, as required to maintain the setpoint temperature. A combustion air blower provides the combustion air supply for these burners.

The combustion air blower uses outside air that is controlled with variable-position, inlet vanes. In automatic, the vanes are partially open at low airflows to prevent blower surging and fully open at high airflows. The vane position can be selected in automatic or remote-manual mode.

Fuel gas is supplied to the afterburner through the fuel gas distribution system. Fuel gas pressure is reduced from the distribution header pressure to 1.25 psig as it enters the fuel gas control racks. Flow control valves modulate the fuel flow rate to each burner. A Fireye™ unit supervises burner operations and performs all burner safety functions required by the National Fire Protection Association (NFPA). The Fireye™ is connected to various, hard-wired interlocks in the burner management system. All furnace purging and lighting operations are done through the Fireye™ system, in conjunction with the PLC.

High temperatures coupled with the 2-second gas residence time ensure complete combustion of organic compounds in the gas stream from the kiln. The gas residence time is based on the volume of the AFB and associated duct work up to the orifice plate. The estimated AFB exhaust gas discharge is 62,047 actual cubic feet per minute (acfm) at 2,250 °F. The residence time of gases in the AFB at this flow rate is 2.87 seconds. The exhaust gas velocity through the AFB, assuming 62,047 acfm flow rate, is 15.4 ft/sec. The residence time is calculated by dividing the AFB volume by the gas flow rate and multiplying the proper unit conversion to change minutes to seconds. The residence time is indirectly measured by the V-Cone™ system, which measures the gas velocity downstream of the AFB. By maintaining the V-Cone™ readings, the residence time is maintained without being continuously calculated.

2.3 NOZZLE AND BURNER DESIGN

The kiln and AFB are equipped with conventional, commercially-available burners. The kiln contains a North American HiRAM 4575-10-B gas burner rated at 8 million Btu/hr, and the estimated heat contribution from waste feed is 8.5 million Btu/hr for a total maximum heat input of 16.5 million Btu/hr. The AFB contains two North American Fast Mix Magna-Flame 4794-12 gas burners, each modified with a 14-inch air inlet. The AFB thermal input ratings are 16 million Btu/hr per burner, or 32 million Btu/hr for the two burners.

The burners in the DFS are equipped with Fire-Eye™ flame scanners as part of the flame safety management system. These scanners continuously monitor flame conditions and are interlocked with the AWFCO to stop waste feed automatically in the event of a flameout.

2.4 DESCRIPTION OF THE AUXILIARY FUEL SYSTEMS

The supplemental fuel for the DFS is natural gas. The commercially available burner for the kiln combines a pilot for ignition and a conventional fuel burner. The burners for the AFB chamber are conventional gas fuel burners with a pilot light for ignition. Supplemental fuel gas will be

continuously fed to the DFS kiln burner and AFB. A flow control valve for each burner controls the fuel. The kiln burner end-temperature controller and the AFB temperature controller determine the flow setpoints. All burners are equipped with independent monitors, controls, interlocks, and fail-safe devices required by the National Fire Protection Association.

2.5 DFS FANS CAPACITIES

Three different fans are used as a part of the DFS. The prime mover for the DFS exhaust gases is a two-stage ID fan that draws the exhaust gases through the kiln, cyclone, AFB, and PAS. These fans have a nominal capacity of 43,670 acfm of exhaust gas at 165 °F when operated at a static pressure of approximately 81 inWC. A 600 horsepower (hp) motor drives each fan.

Combustion air is supplied to the kiln by a fan driven by a 40-hp motor. The fan is rated to deliver 1,475 standard cubic feet per minute (scfm) when operated at a static pressure of 56 inWC. A fan driven by a 75-hp motor supplies combustion air to the AFB. The fan is rated to deliver 8,779 acfm at 93 °F when operated at a static pressure of approximately 27.6 inWC.

The DFS is also equipped with an emergency ID fan that operates in case of a power outage, or one or both stages of the ID fan are lost. The purpose of the emergency ID fan is to maintain a slightly negative draft through the DFS, thereby preventing chemical vapors from accumulating in the kiln and ensuring their destruction in the AFB prior to the AFB losing temperature. A 10-hp motor powers this emergency ID fan, which is rated to deliver 4,700 acfm at 165 °F when operated at a static pressure of approximately 5.4 inWC. Power is provided to this blower by the emergency power supply system.

2.6 DESCRIPTION OF MORTAR PRE-PROCESSING

Palletized mortars are stored at DCD Area 10 in storage igloos. Prior to moving munitions to the TOCDF, the pallets are loaded into ONCs that are vapor-tight, crash-resistant, and fire-resistant containers used for transporting munitions by truck from the igloos to the CHB. The ONCs are delivered to the CHB, which provides safe, temporary storage for chemical munitions prior to unpacking them in the MDB. The CHB is an enclosed structure that holds both full and empty containers during mortar processing. The ONCs are moved from the CHB unloading docks to the container storage area. The ONCs are then moved from the storage area to the CHB transition area on the second floor. From there, the ONCs are moved to the MDB unpack area (UPA), where the pallets of mortars are removed from the ONCs and the mortars removed from the pallets. Both uncontaminated and contaminated dunnage may be generated during the projectile pallet unpacking process. If a pallet does not contain any leaking munitions, and does not come from a storage location that previously held leaking munitions, the dunnage is treated as uncontaminated waste. If the pallet came from a storage location that previously held leaking munitions, the pallet is managed based on results of a sample analysis for chemical agent. If the

analytical results show a representative sample of the dunnage to have mustard concentrations < 200 parts per billion (ppb), the dunnage may be managed off-site as a hazardous waste. If the analytical results show it contains mustard at a concentration ≥ 200 ppb, the dunnage is managed on-site as a State of Utah listed hazardous waste. If a pallet contains leaking munitions, the dunnage is treated as contaminated dunnage.

2.7 DESCRIPTION OF PROJECTILE FEED SYSTEMS

The UPA operators manually unload the mortars onto the projectile/mortar feed conveyor in the UPA. The munitions advance from the UPA projectile/mortar feed conveyor through an airlock to the conveyers in the Explosive Containment Vestibule. The munitions are then advanced to the Projectile/Mortar Disassembly Machine (PMD), which is located in the ECR where the explosive components (fuzes and bursters) are removed and the burster casing is unscrewed from the fuze. Energetic components are delivered to the DFS feed chutes from the PMD by the miscellaneous parts conveyor. The miscellaneous parts conveyor is a hydraulically operated conveyor that extends from the PMD Nose Closure Removal Station (NCRS) to the DFS feed gate. The conveyor runs continuously while the mortar line is running. A chute at the NCRS feeds the components removed at the NCRS to the conveyor. The components on the conveyor are dropped off the end of the conveyor into one of the two DFS feed chutes. Each chute contains a slide blast feed gate located near the elevation of the ECR floor and a tipping valve located near the inlet to the kiln charge end which cycles periodically to feed the components to the DFS. Within each chute, the tipping valve and the blast feed gate are interlocked so that one or the other must be closed at all times. A timed proximity switch sensing the conveyor belt splice monitors miscellaneous parts conveyor operation and alarms in the control room if the conveyor stops.

2.8 DESCRIPTION OF DFS RESIDUE HANDLING SYSTEMS

Residues generated from DFS operations, including HDC residues, cyclone residues, and Brine. Kiln residues are transferred to the HDC, which operates at a speed that provides 15 minutes of residence time at a minimum temperature of 1,000 °F. There are AWFCOs for low temperature and zero motion of the HDC. The HDC discharges residues down a chute into a portable waste bin. Blast protection is provided by the bin blast enclosure. When full, the waste bin is transferred to the residue handling area by forklift. The HDC Bin Enclosure is monitored for agent prior to the bin being removed.

The DFS treatment residues are also collected in the cyclone that is located between the kiln and AFB. Particulate collected in the cyclone falls through an open knife gate, through a flexible hose, and into a 55-gallon drum. The collection point is located inside an enclosure that is monitored for chemical agent.

Brine is collected in one of four 42,900-gallon tanks located in the Brine Reduction Area (BRA). Brine from each of the four TOCDF incinerators is mixed in the tank selected for filling.

The HDC residues, cyclone residues, and Brine are all designated as F999 hazardous waste. These hazardous wastes are also considered “Toxicity Characteristic” for metals. Those wastes with no agent present will be disposed of as directed by the Waste Analysis Plan (WAP).

2.9 DESCRIPTION OF THE AUTOMATIC WASTE FEED CUTOFF SYSTEMS

The primary function of the AWFCO system interlocks is to prevent feeding hazardous waste when incinerator operating conditions exceed values demonstrated during the performance test runs. During startup and shutdown of the DFS or during process upsets, the interlock system automatically stops waste feed and prevents restart until the incinerator is at proper operating conditions and the interlock is manually reset. The feed gates are cycled one time immediately after an AWFCO event to clear the gates of any waste having the potential to combust during extended AWFCO episodes. The AWFCOs associated with kiln exhaust gas and HDC low temperatures cause the kiln to oscillate or the HDC to stop motion, ensuring that partially treated waste does not exit the treatment system.

The AWFCO system will be tested every 14 days. The DFS CPT AWFCO setpoints and the basis for their activation are specified in Appendix B. Tables specifying the process control instruments and their setpoints that will be interlocked with the AWFCO system can be found in Appendix B. The AWFCO parameters are discussed in the following paragraphs.

- **Jammed Feed Chute** – Waste is fed to the kiln through two feed chutes: one feed chute extends down from each of the two ECRs. They join to form a single chute, which feeds the DFS. Two jam sensors are located on the outside of each feed chute prior to where the two chutes join. Radioactive proximity switches are used as jam sensors, and each of these switches (16-XS-207/16XS-208 and 16-XS-209/16-XS-210 for process lines A and B, respectively) cause waste feed to stop when waste material blocks the space between the transmitter and detector (comprising the jam sensor) for a specified length of time.
- **4.2-inch HT Mortar Burster Feed Rate** – The mortar burster feed rates are monitored continuously. The item feed rate is recalculated each time an item is fed to the DFS. Waste feed is stopped when the controller determines that feeding the next item will exceed the setpoint.
- **Kiln Rotational Speed** – Kiln rotational speed is continuously monitored by proximity switch 16-ZX-602. Kiln speed is calculated by measuring the time between activation pulses from the stationary proximity sensor, which happens when the metal flags welded to the outside of the kiln pass the sensor. Waste feed is stopped if the kiln rotational speed falls below or rises above the setpoints.

- Kiln Pressure – Kiln pressure is continuously monitored by a pressure element and pressure-indicating transmitter 16-PIT-018. The kiln is housed in the DFS Room, which is under engineering controls (i.e., ventilation exhausts to MDB High Efficiency Particulate Air filters and carbon filters). Waste feed to the DFS is stopped when the differential pressure between the kiln and the DFS room exceeds the setpoint for longer than 5 seconds. A short time delay is necessary to prevent spurious stop feeds when processing explosive fuzes. The pressure measurement is relative to the DFS room pressure.
- Kiln Pre-Quench Exhaust Gas Temperature – Pre-quench temperatures of the kiln exhaust gas are continuously monitored by thermocouples and temperature indicating transmitters 16-TIT-182 and 16-TIT-244. Outputs from these transmitters are averaged by control loop 16-TIC-182. This average temperature must be above the setpoint before waste feed can start. Waste feed is stopped if the HRA temperature falls below the setpoint.
- Kiln Post-Quench Exhaust Gas Temperature – Post-quench gas temperatures are continuously monitored by thermocouples and temperature indicating transmitters 16-TIT-008 and 16-TIT-169. The output of each of these two temperature transmitters is averaged by control loop 16-TIC-008. Waste feed is stopped when the temperature exceeds the high-temperature setpoint.
- HDC Temperature (lower section) – The temperature of the lower section of the HDC (the section closest to the kiln discharge) is continuously monitored by a thermocouple and temperature indicating transmitter 16-TIT-042. The HDC provides additional residence time at elevated temperature to ensure removal of explosives and propellants. It is included as a process step to comply with the Army 5X decontamination requirement (i.e., exposure of agent-contaminated materials to a temperature of at least 1,000 °F for a minimum of 15 minutes). Waste feed and HDC motion are stopped if the temperature of the lower section of the HDC falls below the setpoint.
- HDC Temperature (upper section) – The temperature of the upper section of the HDC (the section farthest from the kiln discharge and closest to the tipping gate) is continuously monitored by a thermocouple and temperature indicating transmitter 16-TIT-184. Waste feed and HDC motion are stopped if the temperature of the upper section of the HDC falls below the setpoint.
- HDC Tip Gate – Waste residues fall from the HDC into waste bins positioned in the HDC Bin Enclosure. Waste residues exiting the HDC must fall through a double-gated system. The first gate is a Tip Gate. A radioactive proximity switch (16-XS-058), located above the tip gate in the chute, causes waste feed to stop when the detector does not detect the transmitter for a specified time.

- **HDC Slide Gate** – The second gate encountered by waste residues exiting the HDC is a Slide Gate. A radioactive proximity switch (16-XS-821) causes waste feed to stop when the detector does not detect the transmitter for a specified time.
- **HDC Jammed** – The motion of the HDC is continuously monitored. Continuous motion is required to prevent waste residues from accumulating on the HDC and inside the kiln; therefore, waste feed is stopped if no motion is detected. A jam of the HDC causes 16-SSL-057 to activate, which causes an AWFCO.
- **Afterburner Exhaust Gas Temperature** – Temperatures of the AFB exhaust gases are continuously monitored by paired thermocouples and temperature indicating transmitters 16-TIT-092 and 16-TIT-003. The outputs of the two temperature transmitters are averaged for process control by temperature control loop 16-TIC-092. Waste feed is stopped if the HRA temperature falls below the low-temperature setpoint or rises above the high-temperature setpoint.
- **Exhaust Gas Flow Rate** - The pressure drop across a V-Cone® along with the temperature (24-TIT-9430) and pressure (24-PIT-9430) at the V-cone are measured in the exhaust duct and used to calculate an exhaust gas flow rate. The velocity pressure differential from the V-Cone® is continuously monitored by a pressure differential indicating transmitter, and a Programmable Logic Controller (PLC) uses these data to calculate the exhaust gas flow and then sends the data to PDARS as 24-FIT-9430 data. Waste feeds are stopped when the exhaust gas flow exceeds the high or low setpoints established during the DFS VX ATB on an HRA basis.
- **Quench Tower Exhaust Gas Temperature** – Temperatures of the exhaust gases leaving the quench tower are continuously monitored by a thermocouple and temperature indicating transmitter 24-TIT-374 (24-TSHH-001). High exhaust gas temperatures at this location in the process would damage downstream equipment. Waste feed is stopped if the quench tower exhaust gas temperature exceeds the setpoint.
- **Quench Brine Specific Gravity** – The specific gravity of the Brine is continuously monitored by density analyzer 24-DIT-033. High specific gravity could cause plugging of pumps and spray nozzles, lessening the effectiveness of the PAS. Brine is removed from the PAS based on the specific gravity measured. Waste feed is stopped if the density of the quench Brine solution exceeds the 12-hour rolling average setpoint.
- **Quench Brine pH** – The pH of the quench Brine is measured continuously by paired pH probes and analyzing indicating transmitters 24-AIT-007A and 24-AIT-007B. Quench Brine with a low pH is less effective in removing acid gases from the exhaust gas. Only one pH analyzer is online, controlling the quench Brine pH. Waste feed is stopped if the measured value of the quench Brine pH falls below the HRA setpoint.

- Quench Brine Delivery Pressure – Quench Brine delivery pressure to the venturi scrubber is measured continuously by pressure sensor and pressure indicating transmitter 24-PIT-011. Waste feed is stopped if the measured value of the pressure falls below the setpoint.
- Quench Brine to Venturi Scrubber Flow Rate – The flow rate of the quench Brine fed to the venturi scrubber is continuously measured by flow element and flow indicating transmitter 24-FIT-006. Insufficient scrubber Brine to the venturi scrubber lessens the effectiveness of the PAS to remove acid gases and particulates. Waste feed is stopped if the flow rate of quench Brine falls below the HRA setpoint.
- Venturi Scrubber Differential Pressure – The differential pressure (or pressure drop) across the venturi scrubber is continuously measured by a pressure sensor and differential pressure indicating transmitter 24-PDIT-008. An insufficient pressure drop across the venturi scrubber causes the PAS to be less effective in removing acid gases and particulates. Waste feed is stopped if the HRA differential pressure measured across the throat of the venturi scrubber drops below the setpoint.
- Clean Liquor to Scrubber Tower Sprays Flow Rate – Clean liquor is added to the top of the packed bed scrubber by pumping fluid through distribution trays over the pall rings packing. A flow element and flow indicating transmitter 24-FIT-030 continuously monitor the clean liquor flow rate to the packed bed scrubber sprays. Insufficient flow rate of clean liquor over the packed bed scrubber causes the system to become inefficient and may allow acid gases to pass through the packed bed. Waste feed is stopped if the clean liquor flow rate to the packed bed scrubber falls below the HRA setpoint.
- Clean Liquor Delivery Pressure – A pressure element and pressure indicating transmitter 24-PIT-036 continuously monitor the delivery pressure of clean liquor to the packed bed spray bars. Insufficient clean liquor delivery pressure causes the packed bed scrubber to be less efficient in removing acid gases. Waste feed is stopped if the value of the pressure measured falls below the HRA setpoint.
- Exhaust Gas Oxygen Concentration – The O₂ concentration in the exhaust gas is continuously monitored at the ID fan discharge by two O₂ analyzers, 16-AIT-175 and 24-AIT-206. One monitor is designated the primary monitor, and the other is designated the secondary monitor. High exhaust gas O₂ concentration could be indicative of a break in the PAS that causes a dilution of the exhaust gas. Low O₂ concentration can result in the formation of PICs. Exhaust gas O₂ concentrations measured by these CEMS are used to correct CO CEMS measurements to 7% O₂. Waste feed is stopped if the O₂ value measured by the primary monitor rises above or falls below the setpoints.

- Exhaust Gas CO Concentration – Exhaust gas CO concentration is continuously measured at the ID fan discharge by two CO monitors, 16-AIT-059 and 24-AIT-207. High exhaust gas CO may indicate the formation of PICs. Waste feed is stopped if the HRA CO concentration, as measured by either independent monitor, exceeds the permitted value corrected to 7% O₂, dry basis. The O₂ correction factor will be calculated using the following equation:

$$CO_c = CO_m \times \frac{14}{(21 - O_{2m})}$$

where;

CO_c = the stack CO concentration corrected to 7% O₂, dry basis

CO_m = the measured stack CO concentration, dry basis

O_{2m} = the measured stack O₂ concentration, dry basis

- DFS Exhaust Gas Agent Concentration – Agent concentrations are measured at the ID fan discharge by agent monitor PAS 702. This AWFCO stops waste feed to the DFS automatically if the agent concentration exceeds the permitted value.
- Common Stack High Agent Concentration – Agent concentrations are measured by the common stack agent monitors for PAS 707. These AWFCOs stop all waste feeds to all incinerators automatically if the agent concentration exceeds the permitted value.
- Brine Surge Tanks Full – Brine purged from the PAS of each of the four TOCDF incinerators are mixed together and piped to one of four storage tanks. The liquid level in each of these four tanks is continuously monitored. Activation of a level switch causes the tank's inlet valve to close when it is full. Waste feed to all four incinerators is stopped if all four storage tanks are full. The high-high-level switch alarms associated with the four tanks are 23-LSHH-002, 23-LSHH-006, 23-LSHH-702, and 23-LSHH-706.

2.10 EXHAUST GAS MONITORING EQUIPMENT

Exhaust gases from the DFS are monitored on a continuous basis. The DFS has a CEMS for monitoring CO and O₂. Separate agent monitoring systems located in the DFS Duct monitor the chemical agent being processed. Outputs from these monitors are sent to PLCs, which display the results in the Control Room, calculate rolling averages, and archive the data in the Process Data Acquisition and Recording System (PDARS) for future reference.

2.10.1 Continuous Emissions Monitoring Systems

The CEMS monitor the exhaust gas concentrations of CO and O₂. The CEMS will meet all of the performance specifications detailed in “Standards of Performance for New Stationary Sources” (5). Permanently-installed CEMS probes are located in the DFS Duct between the ID fan and the common stack. These probes supply exhaust gas to analyzers dedicated to monitoring the DFS exhaust gas.

The primary functions of the CEMS are to continuously measure, display, and record the gas concentrations in the DFS Duct. The CEMS data are recorded in PDARS. Output from the CEMS will activate alarms and interrupt waste feed when preset values are exceeded. The CEMS will remotely display gas composition and CEMS operational status. The DFS CEMS instrumentation is in a climate-controlled monitoring room located below the DFS Duct in the PAS area.

The PLC will transmit data to PDARS, which will provide remote data recording of CEMS operations at the Control Room. All analog and digital input/output signals will be conditioned properly to reduce noise and isolate signals from voltage transients. The PDARS will display and record the uncorrected and rolling average concentrations. The indication of all gas composition will be updated at least every 15 seconds. In addition, the PLC will activate alarms and initiate an AWFCO when high CO, low O₂, or high O₂ concentrations are detected in the combustion gas, or when the PDARS experiences a loss of analyzer signal.

The exhaust gas sample enters the CEMS train through a probe assembly located in the combustion gas duct, where PM is removed. The sample is then drawn through a heated line to the sample conditioning system where it is prepared for analysis in the analyzers.

2.10.1.1 Carbon Monoxide Monitors

The CO analyzers, 16-AE-059 and 24-AE-207, are Teledyne©, Advanced Pollution Instrumentation Division, model 300EM, non-dispersive infrared (NDIR) analyzers as described in 40 CFR 60, Appendix A, Method 10 (2). The analyzers are calibrated on two ranges, according to Attachment 20 (3), within the expected concentration ranges for the incinerator. These calibrations include analyses of a zero gas and a span calibration gas. The CO monitor sends a reading to a PLC every 15 seconds. These readings are averaged over 1 minute and corrected to 7% O₂ based on PLC input from the O₂ CEMS. The PLC calculates an HRA from the 1-minute averages, and the averages are sent to PDARS. The 40 CFR 60, Appendix B, Performance Specification 4B, is used to evaluate the CO CEMS performance and determine whether the CO CEMS meets the calibration drift requirements. The CO CEMS initiates an AWFCO when either independent analyzer detects CO concentrations higher than the setpoint. If one CO monitor fails or is taken offline, data from the other CO monitor will be used to verify correct system operation. If both CO monitors fail, an AWFCO will be initiated.

The NDIR analyzer specifications include:

- Ranges: 0-200, 0-5000 ppm;
- Accuracy: ± 1 % of full scale;
- Drift: < 1 % of full scale per week;
- Reproducibility: < 0.5 % of reading; and
- Response time: Variable, 90 % of full scale in 0.5 to 20 seconds, application dependant.

The CO CEMS are drift checked daily. Gases at 0 to 2 % and 60 to 90 % of instrument span are used to drift check the CO analyzers. Calibration gases are injected into the sampling system at the duct by opening the solenoid valve on each certified gas standard cylinder to allow the reference gas to flow, under pressure, to the sample probe. The reference gas is drawn through the sample transport, sample conditioning, and sample delivery systems, and is analyzed in the same manner as an exhaust gas sample. Calibration results are stored in and printed from PDARS. The concentrations of the reference gases span the expected concentrations of the exhaust gas. The span gas calibrations are considered a verification of the quality of the CEMS data.

2.10.1.2 Oxygen Monitors

The O₂ analyzers 16-AE-175 and 24-AE-206 are Ametek®, Thermox™ Instrument Division, FCA zirconium oxide electrochemical detectors. The analyzers are calibrated according to Attachment 20 (3) using a zero gas and span calibration gases. The 40 CFR 60, Appendix B, Performance Specification 3 (5), is used to evaluate the O₂ CEMS. The Thermox™ Ametek® FCA analyzer specifications include:

- Range: 0-25 Volume %;
- Accuracy: ± 2 % of full scale;
- Drift: < 0.1 % of cell output per week;
- Reproducibility: ± 0.2 % of measured value; and
- Response time: 90 % of step change in 5 seconds

The O₂ CEMS are calibrated daily using a two-point calibration method. Gases at 0 to 2 % and 60 to 90 % of instrument span are used to calibrate the O₂ analyzers. Calibration gases are injected into the sampling system at the duct by opening the solenoid valve on each certified gas

standard cylinder to allow the reference gas to flow, under pressure, to the sample probe. The reference gas is drawn through the sample transport, sample conditioning, and sample delivery system, and is analyzed in the same manner as an exhaust gas sample. Calibration results are stored in and printed from PDARS. The concentrations of the reference gases span the expected exhaust gas concentrations. The span gas calibrations are considered a verification of the CEMS data quality.

2.10.2 Agent Monitoring Systems

Operations of the agent monitoring systems are discussed in Attachment 22 to the TOCDF RCRA Permit (6) and in Appendix A. Agent concentrations in the plant and in the exhaust gas are monitored using ACAMS and DAAMS. These systems have undergone extensive testing and evaluation under both simulated and actual field conditions.

Operations of the ACAMS and DAAMS are controlled by Laboratory Operating Procedures. These systems use a Gas Chromatograph with a Flame Photometric Detector (GC/FPD) for the detection of mustard. Exhaust gases are monitored on a continuous basis to ensure that chemical agents are not emitted to the environment. An AWFCO is initiated if an ACAMS alarm occurs in the DFS Duct (PAS 702) or the common stack (PAS 707 for mustard). The ACAMS alarms on the DFS Duct (PAS 702) and the common stack are the only ACAMS that impact sampling directly. If PAS 702 or PAS 707 ACAMS alarm or malfunction, sampling will cease.

The precision and accuracy of each monitoring system are determined through actual onsite testing after installation of the equipment, and checks are performed at periodic intervals. These data are used to establish quality control bounds, calibration and challenge frequencies, and procedures. These challenge frequencies and procedures are then delineated in a quality control plan for each system.

Exhaust gases are difficult to sample because of their high temperature and high moisture content. The ACAMS Dilution Air Flow Controller (ADAFC) is used in conjunction with the ACAMS to allow sampling directly from a duct. The ADAFC provides more accurate and reproducible results by conditioning the exhaust gas prior to sampling and analysis. The ACAMS consists of a sampling pump, a sample collection module, a GC/FPD, a monitor with strip chart recorder, and a computer interface module for automated data acquisition. The ACAMS uses the GC column to separate other compounds from agent and the selectivity of its FPD to improve the specificity of the response to chemical agents. The ACAMS provides quantitative agent data. The ACAMS cycle time in the mustard mode will be five minutes based on testing results. The ACAMS Limit of Quantification (LOQ) at the SEL level is 0.006 mg/m^3 .

The DAAMS is a sampling and analysis system capable of detecting Agents GB, VX, and mustard. TE-LOP-522 and TE-LOP-562 cover collection and analysis, respectively, of samples on the DAAMS tubes. A DAAMS Dilution Air Flow Controller (DDAFC) conditions the exhaust gases sampled by the DAAMS. The DDAFC lowers the gas dew point to improve

collection efficiency for organic compounds on the DAAMS tube sorbent bed for subsequent analysis. The TOCDF Chemical Assessment Laboratory (CAL) will analyze the DAAMS tubes. The LOQ for a DAAMS tube analysis is about 0.006 mg/m³ mustard.

The DAAMS tubes will be used to determine the agent concentrations used in the mustard emissions calculation for the CPT. A Quality Plant (QP) sample is a field surrogate sample. A QP sample will be run with each DAAMS set during the CPT to verify that agent is not lost from the DAAMS tubes during sample collection. The QP sample is a DAAMS tube spiked with mustard before sample collection.

In the case of an ACAMS alarm, the sample time used to calculate the DAAMS concentration will equal the time the ACAMS is in alarm. If the normal DAAMS sample period ends during the alarm condition, the sampling period will be extended until the ACAMS clears to avoid missing any mustard in the exhaust gas. The DAAMS sampling period during the CPT will be one hour unless there is an agent alarm.

2.11 POLLUTION ABATEMENT SYSTEM

The DFS PAS includes the following equipment:

- Quench tower;
- Venturi scrubber;
- Scrubber tower;
- Demister;
- ID fan; and
- Duct to the common stack.

The quench tower four primary purposes are to:

- Cool the AFB exhaust gas to protect downstream PAS devices.
- Provide a contact chamber for PM and acid gas removal.
- Saturate the combustion gas to optimize performance of the venturi scrubber.
- Rapidly reduce the exhaust gas temperature to reduce the potential for PIC formation in the PAS.

Exhaust gases travel from the AFB to the quench tower where they go through a series of brine sprays that cool the gases by evaporating water. The Brine quench pipe supplies the quench tower with Brine from the scrubber tower reservoir. Brine is sprayed into the top of the tower at a rate in excess of the maximum expected evaporation load. The excess water drains from the quench tower back to the scrubber tower reservoir. The quench Brine pump discharges through strainers where large PM are removed. Water required to maintain the level in the scrubber tower reservoir is added to the Brine pump discharge upstream from the quench tower spray nozzles.

The saturated exhaust gas stream will exit the quench tower and enter the high-energy venturi scrubber, which is designed for high-efficiency PM and acid gas removal. The exhaust gas stream contacts a controlled flow of Brine to form droplets that coalesce or combine in the venturi scrubber throat to remove sub-micron PM and neutralize acid gases. The venturi scrubber has a variable throat controller that may be set within the range of 20 to 50 inWC across the throat. Sodium hydroxide (18%) is added to the Brine as required to maintain the $\text{pH} \geq 7.0$ in the scrubber tower reservoir. Exiting the venturi scrubber, the exhaust gas stream flows through a 90° elbow before entering the scrubber tower reservoir. As the stream traverses the elbow, PM and water droplets are forced to the bottom of the duct and drain into the reservoir.

The two-phase effluent (gas and liquid) from the venturi scrubber enters the scrubber tower. The liquid falls to the scrubber tower reservoir while the gas rises through the chimneys of the clean liquor tray. The clean liquor pump circulates clean liquor from the bottom of the clean liquor tray to the top of the packing. The pH and density of the clean liquor are adjusted by adding NaOH or water. The rising gas is contacted with this scrubbing solution in the packed bed, so that acid gases are absorbed by the solution and neutralized. Circulation of solution is controlled to ensure adequate contact between liquid and gas at the maximum expected gas flow. Gases rising from the packed bed pass through a mist eliminator that causes liquid droplets to coalesce and drain to the reservoir tray in the packed bed.

The clean liquor pH is adjusted by adding 18 % NaOH. When water or NaOH are added, excess clean liquor overflows the clean liquor tray through the chimneys and falls into the scrubber tower reservoir where it mixes with the Brine solution, which is circulated back to the venturi scrubber and quench tower. The Brine and clean liquor pH readings are recorded by PDARS.

Density is monitored in the pump discharge lines of the Brine loop and the clean liquor loop. The density meter in the Brine loop generates a proportional signal that modulates a control valve to transfer Brine to the holding tanks in the BRA. As Brine is discharged, process water is added to maintain the liquid level and decrease the density. The transfer of Brine continues until the density drops below the setpoint. Brine is managed as an F999 waste as described in the TOCDF RCRA Permit WAP. Water is also added to the clean liquor loop to reduce density. The added water causes the fluid levels to rise and overflow the chimneys into the scrubber tower reservoir. The density of the Brine and clean liquor are recorded by PDARS.

The scrubber tower effluent enters the demister to complete removal of entrained solids and liquid droplets. The gas enters from the bottom and flows upward through and around candles that strip entrained moisture and solids. The solids remain on the candles while the liquid accumulates in the vessel bottom and is pumped to the scrubber tower reservoir. The DFS PAS includes a dedicated demister and a shared spare (i.e., between the DFS PAS and the MPF PAS is a spare demister that can be lined up to either incinerator). The spare allows periodic replacement of the demister candles without significantly affecting operations. An atmospheric bleed damper is located just before the demister to prevent the ID fan from overheating during startup when the incinerator cannot tolerate high air flows. This damper is manually closed and covered during agent operations.

Exhaust gases travel from the demister to the ID fan. This fan is the prime mover of exhaust gases through the system. In conjunction with its suction side damper, it controls the pressure inside the incinerator. The pressure is sensed at the kiln and controlled at a negative pressure with respect to the DFS room. The kiln differential pressure sensor modulates the damper on the suction side of the fan. Once through the ID fan, the exhaust gases are above atmospheric pressure as they enter the duct to the common stack manifold and flow into the common stack. The CPT sampling ports are located in the duct between the ID fan and the common stack.

Operating information for major PAS components are:

- Quench Tower – The quench tower contains spray nozzles to cool and humidify the exhaust gas to saturation. The gas outlet temperature will be approximately 200 °F. Brine is sprayed into the tower at a rate in excess of the maximum expected evaporation load. The quench tower has a 10.5-foot inside diameter and is 40 feet high with a conical top and bottom. It drains to the scrubber tower reservoir.
- Venturi Scrubber – The venturi scrubber (PAS-SEPA-102) was manufactured by Anderson 2000, Inc. The Brine flow rate to the venturi quench is about 325 gpm. The differential pressure across the DFS PAS venturi scrubber is ≥ 30 inWC. The scrubber solution to the venturi scrubber will be pH controlled with 18 % NaOH to maintain the $\text{pH} \geq 7.0$.
- Scrubber Tower – The scrubber tower performs three functions. First, the lower section provides a 184-ft³ Brine reservoir. Second, the midsection holds a clean liquor reservoir and a pall ring packed bed. Clean liquor flows over the pall rings to remove acid gases and PM from the exhaust gases. Third, the top contains a mist eliminator, which removes entrained moisture from the gases as they exit the tower. A minimum of 20 inches of Brine is maintained in the reservoir to ensure adequate prime for the quench Brine pumps. Clean liquor flow to the packed bed is about 1,000 gpm. The scrubber tower has a 9-foot inside diameter and is 40 feet high with a conical top and bottom.

- Demister – This cylindrical fiberglass vessel contains multiple candle structures that remove moisture and entrained solids from the gas stream passing up through them. The moisture falls to the bottom of the demister and is pumped to the scrubber tower reservoir. The DFS and MPF share a spare demister to allow candle change-out with minimal impact on operations. The demister has a 13-foot inside diameter and is 33 feet high with a conical bottom.
- Induced Draft Fan – The DFS prime mover is a two-stage centrifugal fan (Robinson Industries, Inc., Model 5800). The fan is designed to maintain a negative pressure in the incinerator and PAS and is rated for an inlet gas flow of 43,670 acfm at 165 °F with an induced draft of 81 inWC. Two 600-hp induction motors drive the stages of the fan.
- Quench Brine System – The quench brine system is the network of pumps, valves, and piping that collects drainage from the quench tower and demister into the scrubber tower reservoir, and pumps Brine to provide sprays in the quench tower and scrubber solution for the venturi scrubber. Two 642-gpm Brine pumps and a 24-gpm demister water-return pump are the prime movers of Brine through the system. The system also controls Brine pH and density through instrumentation and control valves.
- Clean Liquor System – The clean liquor system is a network of pumps, valves, and piping that provides the scrubber solution for the packed bed chimneys in the scrubber tower. One of two 2,400 gpm clean liquor pumps draws from the trays beneath the chimneys and discharges clean liquor over the tops of the packed beds. The system controls clean liquor pH and density with instrumentation and control valves.

2.12 CONSTRUCTION MATERIALS

The construction materials for the incinerator system components are listed in Table 2-1.

TABLE 2-1. DFS CONSTRUCTION MATERIALS
DFS CPT Plan

COMPONENT	CONSTRUCTION MATERIAL
Kiln	RA 253 steel
Kiln Combustion Air Blower	Carbon steel
Cyclone	Refractory-lined (alumina 75 to 89%, calcium aluminate < 25%, iron oxide < 7%) carbon steel
Afterburner	Refractory-lined (alumina 62 to 66%, silica 1 to 3%) carbon steel
Afterburner Combustion Air Blower	Carbon steel
Quench Tower	Hastelloy® C
Venturi Scrubber	Hastelloy® C
Scrubber Tower	Hastelloy® C
Demister	Fiberglass-reinforced plastic with Nexus coating
Induced Draft Fan	Type 316 stainless-steel hub and shaft, ASTM A 240 Alloy 255 wheel, epoxy-coated, carbon-steel housing
Quench Brine Pumps	Hastelloy C
Clean Liquor Pumps	Type 316 stainless steel
Demister Water Return Pump	Type 316 stainless steel

2.13 LOCATION AND DESCRIPTION OF TEMPERATURE, PRESSURE, FLOW INDICATING, AND CONTROL DEVICES

A general description of temperature, pressure, flow, and other instrumentation necessary to ensure compliance with all permit conditions is provided in this section as well as a discussion of the major controls of the DFS. Appendix B shows the instruments that are used to monitor the regulated plant operations and record data for the facility operating record and the CPT; it also includes lists of the alarm settings for key process monitoring equipment.

The control system has a centralized control console, including closed-circuit television monitors for observing operations at various locations, and locally-mounted PLCs. Most processing and sequencing operations are controlled automatically through the PLCs. Interlocks are provided to prevent improper facility operation. These interlocks are monitored and continuously checked to catch any failure to complete a programmed step. The PDARS logs any abnormal conditions,

operator entries into the system, and starting/stopping of equipment with the time of occurrence.

The control system provides continuous automatic control of the incineration process. In monitoring critical functions, the process control system gives advance warnings using pre-alarms, which indicate that an alarm condition is developing and gives operators time to take corrective actions.

The proper operation of this monitoring and control equipment is necessary to ensure consistent compliance with all permit conditions, and safe and efficient operation of the DFS. Although all process monitoring instrumentation receive periodic maintenance, equipment critical to compliance with permit operating conditions receives additional attention. Key issues associated with these instruments include:

- Continuing and preventive maintenance;
- Verification of instrument calibration; and
- Verification of AWFCO integrity.

The preventive maintenance program is supported by information received from daily and periodic inspections of the process and equipment. Instrument calibration and preventive maintenance is performed following the procedures and frequencies shown in Table 2-2. A description of the most significant control loops follow.

Some of the temperature controllers measuring RCRA-regulated parameters use the input from two thermocouple and transmitter pairs to generate a value. This value is the average of the values reported by the transmitters. If one thermocouple fails, the value reported by the failed thermocouple transmitter defaults to the high range of the transmitter. A transmitter reporting a value equal to its high-range value is recognized by the controller to have failed, and the controller then reports the value from the single functioning transmitter.

TABLE 2-2. INSTRUMENT CALIBRATION FREQUENCY
DFS CPT Plan

ITEM	INSTRUMENT TAG IDENTIFICATION	INSTRUMENT	CALIBRATION FREQUENCY (DAYS)
1	16-PIT-018	Kiln Pressure	180
1.a	16-PSHH-204	Kiln Pressure High Automatic Waste Feed Cut-Off	180
2	16-TIT-182	Pre Quench Kiln Exhaust Gas Temperature	180
	16-TIT-244	Pre Quench Kiln Exhaust Gas Temperature	180
3	16-TIT-008	Post Quench Kiln Exhaust Gas Temperature	180
	16-TIT-169	Post Quench Kiln Exhaust Gas Temperature	180
4	16-TIT-042	Discharge Conveyor Temperature (lower)	180
5	16-TIT-184	Discharge Conveyor Temperature (upper)	180
6	16-TIT-092	Afterburner Exhaust Gas Temperature	180
	16-TIT-003	Afterburner Exhaust Gas Temperature	180
7	24-TIT-374	Quench Tower Exhaust Gas Temperature	90
7.a	24-TSHH-001	Quench Tower Exhaust Gas Temperature High Automatic Waste Feed Cut-Off	360
8	24-DIT-033	Quench Brine Density	180 ^a
9	24-AIT-007A	Quench Brine pH	7
	24-AIT-007B	Quench Brine pH	7
10	24-PIT-011	Quench Brine Delivery Pressure	180
11	24-AIT-034A	Clean Liquor pH	14
12	24-AIT-034B	Clean Liquor pH	14
13	24-DIT-035	Clean Liquor Density	180
14	24-PDIT-025	Packed Bed Differential	360
15	24-FIT-006	Quench Brine to Venturi Scrubber Flow	180 ^b
16	24-FIT-9430	Exhaust Gas Velocity	180
17	24-FIT-030	Clean Liquor to Scrubber Tower Sprays Flow	180 ^b
18	24-PIT-036	Clean Liquor Delivery Pressure	180
19	24-AIT-206	PAS Blower Exhaust Gas O ₂ Conc.	Daily ^c
20	16-AIT-175	PAS Blower Exhaust Gas O ₂ Conc.	Daily ^c

TABLE 2-2. INSTRUMENT CALIBRATION FREQUENCY (continued)

ITEM	INSTRUMENT TAG IDENTIFICATION	INSTRUMENT	CALIBRATION FREQUENCY (DAYS)
21	24-AIT-207	PAS Blower Exhaust Gas CO Conc.	Daily ^c
22	16-AIT-059	PAS Blower Exhaust Gas CO Conc.	Daily ^c
23	24-PDIT-008	Venturi Pressure Drop	360
24	24-PIT-9430	V-Cone Pressure.	180
25	24-FIT-9430A/B	V-Cone Temperature	180
26	PAS-702	PAS Blower Exhaust Gas Mustard Conc.	4 hr ^d
27	PAS-707	Common Stack Exhaust Gas Agent Concentration	4 hr ^d
28	23-LSHH-002 23-LSHH-006 23-LSHH-702 23-LSHH-706	All BRA-TANKS Filled	360 ^e

^a Preventive maintenance schedule. Density instrument calibration is indicated by a manufacturer's certificate.

Preventive maintenance includes comparison of the instrument reading to a hydrometer measurement.

^b Preventive maintenance schedule. Transmitter is calibrated by an internal frequency generator.

^c CEMS are managed as specified in Attachment 20 (3).

^d ACAMS are managed as specified in Attachment 22 (6).

^e Preventive maintenance schedule. Switches are function checked for fluid/no fluid at sensor indication.

Level is set by installation level.

2.13.1 Kiln Waste Feed Rate Control

Environmental permit conditions currently applicable to the DFS for Agent VX specify agent and PEP feed rates. These permit conditions were established during the DFS VX ATB. Permit conditions specify the quantity of munitions (mortars) that can be fed on an hourly basis. The PEP feed rates are controlled by the quantity of munitions fed. The mustard feed rate has no application to the processing of mortars since the burster well separates the mustard from the fuze and buster casings resulting in no mustard being fed to the DFS.

The DFS Operator requests feed by selecting the FEED MUNITIONS icon on the control system console. Munitions feed begins if no feed-inhibit interlocks are in effect. The DFS feed does not resume automatically when interrupted by an interlock or by the operator. The operator must manually initiate feed. The quantities of munitions fed are controlled by the DFS controller, which counts the number and time each ECR feed gate cycles. The controller prevents waste feed by not allowing the feed gates to cycle if the controller determines that an additional cycle of either feed gate will cause the limit for number of munitions to be exceeded.

2.13.2 Kiln Pressure Control

The differential pressure between the DFS Room and the kiln is monitored constantly by means of pressure transmitter 16-PIT-018. Pressure controller 16-PIC-018 sends a signal to 16-PV-018 located near the suction of the DFS ID fan. The 16-PIC-018 modulates 16-PV-018 to maintain the kiln at least 0.1 inWC more negative than the DFS Room. High-high kiln pressure switch 16-PSHH-204 actuates alarm switch 16-PAHH-204 and an AWFCO if the differential pressure between the DFS Room and the kiln is < 0.1 inWC with a 5-second delay. A continuous record of the kiln pressure is maintained by PDARS through 16-PIC-018 and 16-PAHH-204.

2.13.3 Kiln Exhaust Gas Temperature and Burner Controls

Kiln exhaust gas temperature is a function of both the energetic waste feed rate to the kiln and the firing rate of the burner. The kiln temperature is controlled by modulating the burner firing rate based on either the burner end temperature controller (16-TIC-020) or the kiln exhaust temperature controller (16-TIC-182), whichever requires the greater fuel demand.

An AWFCO is triggered if the kiln pre-quench exhaust gas temperature falls below the HRA setpoint as indicated by 16-TALL-182.

The temperature of the exhaust gas in the duct just downstream of the kiln is controlled in a similar manner. Two thermocouples downstream of the kiln exhaust gas quench are averaged, and the average temperature signal is sent to a temperature controller, which modulates water flow to an air-atomized water quench spray. If the temperature is below the setpoint, the valve is

modulated closed. The exhaust gas temperature controller setpoint is 1,525 °F. To prevent water leaking into the duct, a block valve in the water line is closed if the temperature goes below 1,000 °F. The AWFCOs are triggered if the kiln post-quench exhaust gas temperature exceeds the setpoints as indicated by 16-TAHH-008. A continuous record of all the temperatures discussed above is maintained by PDARS.

2.13.4 Afterburner Exhaust Gas Temperature and Burner Control

The DFS AFB is equipped with two burners. Temperature control is accomplished through dual-redundant thermocouples 16-TE-092 and 16-TE-003. Modulating the firing rate of the burners controls the AFB temperature. The average temperature measured inside the chamber feeds temperature controller 16-TIC-092, which supplies a setpoint to the fuel flow controller. The flow controller modulates the fuel flow control valves. If the measured temperature of the exhaust gas is above the setpoint, the fuel flow controller setpoint is decreased, causing the fuel valves to be modulated closed; if the measured temperature is below the setpoint, the fuel flow controller setpoint is increased, causing the fuel valves to be modulated open.

The AWFCOs 16-TALL-092 and 16-TAHH-092 are triggered if the AFB exhaust gas temperature exceeds the setpoints. Data associated with these operating parameters are recorded and archived by PDARS.

2.13.5 Heated Discharge Conveyor Temperature Control

When agent and explosive-contaminated items are to be thermally decontaminated, the U.S. Army requires that those items to be exposed to a temperature of 1,000 °F or greater for at least 15 minutes. Items thermally treated to these requirements are given a XXXXX (5X) decontamination certification and allowed to leave government control. Because the residence time of solid waste residues in the DFS kiln is approximately 7 minutes, the HDC is used to provide the additional residence time at temperature necessary to meet the Army requirements.

The HDC is a 60-foot long metal mesh-chain conveyor that is surrounded by an insulated steel housing. It is equipped with two banks of electric heating elements, each controlled through on/off controllers with a setpoint of 1,100°F. The heaters are on and off based on 2-minute intervals of the percent on. The controller varies the proportion to maintain the temperature. An independent temperature controller controls each heater bank, and an AWFCO is activated if the temperature measured by either controller drops below 1,000 °F.

2.13.6 Quench Outlet Gas Temperature

The quench outlet gas temperature is measured by means of thermocouple 24-TE-374. The temperature is fed through temperature indicating transmitter 24-TIT-374 to the PLC for continuous process monitoring. If a high temperature in the quench outlet gas is detected, pre-alarm 24-TAH-374 is activated. If a high-high quench exit temperature is detected, the control

system will trigger an AWFCO and cause emergency quench spray valve 24-TV-01 to open. If the temperature increases to the high-high-high value, the DFS burners are automatically shutdown, and the PAS continues to operate to cool and scrub the exhaust gases.

2.13.7 Quench Brine Flow

Brine flow to the quench tower sprays is measured by means of magnetic flow meter 24-FE-02. Acting on input from the flow meter 24-FI-02, flow indicating controller 24-FIC-02 modulates control valve 24-FV-02 to ensure proper flow to the quench tower, and provides input to PDARS for continuous process monitoring. Low-flow alarm 24-FAL-02 provides warning in the Control Room if quench Brine flow falls below 200 gpm.

2.13.8 Quench Brine Delivery Pressure

Adequate Brine delivery pressure is essential to the proper operation of the quench tower and the venturi scrubber. Instrument 24-PIT-011 monitors the discharge pressure of the operating centrifugal Brine pump, PAS-PUMP-106 or 107, and provides input to PDARS for continuous process monitoring. Should pressure fall to 75 psig, 24-PALL-011 would alarm and actuate an AWFCO.

2.13.9 Venturi Scrubber Brine Flow

Brine is sprayed radially and tangentially into the venturi scrubber. The Brine flow rate is measured by the magnetic flow meter 24-FE-006. Flow indicating controller 24-FIC-006 uses data from Brine flow indicating transmitter 24-FIT-006 to modulate control valve 24-FV-006 to ensure proper Brine flow to the venturi scrubber. Brine flow data are provided to PDARS for continuous process monitoring. Low flow alarm 24-FAL-006 actuates an AWFCO if flow falls below the setpoint on an HRA basis.

2.13.10 Brine pH

Brine pH is monitored by means of alternating pH analyzers 24-AE-007A and 007B. Indicating controller 24-AIC-007 modulates control valve 24-AV-007 to adjust the addition of caustic to maintain the desired pH, and provides input to PDARS for continuous process monitoring. Low-low pH alarm 24-AALL-007 actuates an AWFCO if the pH falls below the setpoint on an HRA basis.

2.13.11 Brine Density

Brine density is monitored by density meter 24-DE-033. Indicating controller 24-DIC-033 modulates control valve 24-DV-33 to transfer Brine to the Brine surge tanks while 24-LV-010 opens to introduce process water to the system, thus reducing overall Brine density. The same controller also provides input to PDARS for continuous process monitoring. High-high density

alarm 24-DAHH-33 actuates an AWFCO if Brine specific gravity increases above the setpoint on a 12-hour rolling average basis.

2.13.12 Venturi Scrubber Differential Pressure

Pressure indicator 24-PDIT-008 measures the differential pressure across the venturi scrubber. Indicating controller 24-PDIC-008 provides input to PDARS for continuous process monitoring. The same PDIC provides high and low differential pressure alarms 24-PDAH-008 and 24-PDAL-008, respectively. An AWFCO is initiated if the differential pressure falls below 30 inWC on an HRA basis.

2.13.13 Scrubber Tower Sump Level Control

The scrubber tower sump level is measured by means of level indicating transmitter 24-LIT-010. Indicating controller 24-LIC-010 provides input to PDARS for continuous level monitoring. The same indicating controller provides high- and low-level alarms 24-LAH-010 and 24-LAL-010, respectively. It also controls level in the scrubber tower sump by modulating valve 24-LV-010 to adjust the quantity of process water added to the quench tower sprays. If a low-low level is detected, low-low level alarm 24-LALL-024 will be activated. If a high-high level is detected, alarm 24-LAHH-032 will be activated. If either the low and low-low level alarms or the high and high-high level alarms are simultaneously activated, the furnace will automatically shutdown. Additionally, if 24-LAHH-032 is activated, all liquid inputs to the scrubber sump other than Brine spray are isolated.

2.13.14 Clean Liquor Flow Control

Clean liquor is pumped to the top of the packed bed scrubber and spread evenly over the pall rings by distribution trays. The flow rate is measured by magnetic flow meter 24-FE-030. Flow indicating controller 24-FIC-030 uses data from 24-FE-030 to modulate control valve 24-FV-030 to ensure proper circulation of liquor from the chimney tray to the top of the packed bed. The 24-FIC-030 provides input to PDARS for continuous process monitoring. Low-low flow alarm 24-FALL-030 actuates an AWFCO if flow falls below the setpoint on an HRA basis.

2.13.15 Clean Liquor Delivery Pressure

Adequate clean liquor delivery pressure is essential to the proper operation of the scrubber tower. Pressure indicator 24-PIT-036 monitors the discharge pressure of the operating centrifugal clean liquor pump, PAS-PUMP-108 or -109, and provides input to PDARS for continuous process monitoring. Should pressure reach 35 psig over an HRA, 24-PALL-036 would alarm and actuate an AWFCO.

2.13.16 Clean Liquor Level Control

Scrubber tower chimney tray level is measured by level indicating transmitter 24-LIT-031. Indicating controller 24-LIC-031 provides input to PDARS for continuous level monitoring. The same LIC provides low-level alarm 24-LAL-031. It also controls level in the chimney tray by modulating valve 24-LV-031 to adjust the quantity of process water added to the clean liquor discharge. If a low level is detected, low-level alarm 24-LAL-031 will be activated.

2.13.17 Clean Liquor pH Control

Clean liquor pH is monitored by means of alternating pH analyzers 24-AE-034A and 034B. Indicating controller 24-AIC-034 modulates control valve 24-AV-034 to adjust the addition of caustic to maintain the desired pH, and provides input to PDARS for continuous process monitoring. The alarms 24-AAD-034, 24-AAH-034, 24-AAL-034, and 24-AALL-034 provide alarms to alert the operator should pH rise or fall outside of the desired range or if the difference in pH between the analyzers is unacceptable. This parameter is a MACT alarm that is activated on an HRA basis.

2.13.18 Clean Liquor Density Control

Clean liquor density is monitored by density meter 24-DE-035. If indicating controller 24-DIC-035 senses density in excess of desired values, it overrides level controller 24-LIC-031 to open control valve 24-LV-031 and increase the flow of process water to the packed beds, thus reducing overall clean liquor density. The same controller also provides input to PDARS for continuous process monitoring. High density alarms 24-DAH-035 and 24-DAHH-035 inform the operator if clean liquor specific gravity rises above the desired value. This parameter is a MACT alarm that is activated on a 12-hr rolling average basis.

2.13.19 Demister Level Control

The exhaust gas exits the scrubber tower and flows into the demister to remove any remaining water droplets and PM. Liquids and entrained particles drain to the vessel sump. Over time, the sump level increases and must be drained from the vessel. The liquid level is monitored by level indicating transmitter 24-LIT-314 and controlled by level indicating controller 24-LIC-314. The 24-LIC-314 also provides continuous level input to PDARS. When the liquid level reaches 14 inches, DFS demister water return pump PAS-PUMP-138 is energized and 24-LIC-314 modulates control valve 24-LV-314 to lower the level to 10 inches by directing flow to the scrubber tower sump. To avoid constant cycling of PAS-PUMP-138, liquid is continuously circulated to the demister through pressure control valve 24-PCV-754 when not pumping liquid to the scrubber tower sump. High, high-high, and low-level alarms are also provided from 24-LIC-314. Low-low level switch 24-LSLL-315 provides an alarm and causes shutdown of PAS-PUMP-138 and DFS demister empty out pump PAS-PUMP-120 to protect against operating the pumps with an empty sump. Similarly, high-high level switch 24-LSHH-313 alerts the operator

to take action before the candles are flooded. Equivalent instrumentation and control valves are provided for the spare demister.

2.13.20 Demister Candle Pressure Drop

Particulate matter carried by the exhaust gas into the demister may become embedded in the candle filter elements. Over time these particles increase the pressure drop across the candles and limit their effectiveness, so eventually, replacement of the candle filter elements is required.

Differential pressure indicating transmitter 24-PDIT-312 senses the pressure drop, while 24-PDI-312 provides continuous pressure drop input to PDARS and provides alarms when the pressure drop increases to unacceptable values. High differential pressure alarm 24-PDAH-312 alerts the operator that the filter elements require replacement. If no action is taken, high-high differential pressure alarm 24-PDAHH-312 causes feed to the furnace to stop. Equivalent instrumentation is provided for the spare demister.

2.13.21 DFS Bleed Air Valve Operation

The DFS exhaust blowers require a minimum flow at all times to cool the fan wheels and prevent thermal distortion. During startup and periods of extended idle, turndown conditions are extreme and necessitate augmenting combustion air flow with outside air to provide minimum blower flow. This is accomplished by using manual controller 24-HIC-752 to open 24-HV-752 and introducing outside air. The 24-HV-752 must be completely closed before waste feed can begin. The air intake to 24-HV-752 must be capped before waste feed may begin to ensure that no path exists for agent migration to the atmosphere and to prevent inadvertent dilution of monitored emissions.

2.13.22 DFS Exhaust Gas Oxygen Concentration

The DFS exhaust gas O₂ concentrations are measured continuously by O₂ analyzers 16-AIT-175 and 24-AIT-206. Oxygen concentrations are also displayed and provided continuously to PDARS by 16-AIT-175 and 24-AIT-206. If the O₂ concentration is below the preset low-low level setpoint, alarms 16-AAL-175 and 24-AAL-206 are activated and an AWFCO is initiated. If the O₂ concentrations are above the high-high level setpoint, alarms 16-AAH-175 and 24-AAH-206 are activated and an AWFCO is initiated.

2.13.23 DFS Exhaust Gas Carbon Monoxide Concentration

The DFS exhaust gas CO concentrations are measured continuously by CO analyzers 16-AIT-059 and 24-AIT-207. These analyzers display results locally and provide continuous CO data to the PLCs. The PLCs calculate a one-minute average and a one-hour rolling average corrected to 7% O₂ dry volume. The one-hour average is compared to the RCRA limit of 100 ppm_{dv}. If the CO concentrations are above the limit, the alarms 16-AAH-059 or 24-AAH-207 are activated and an AWFCO is initiated. The average values are stored by PDARS.

2.13.24 DFS Exhaust Gas Mustard Concentration

The DFS exhaust gases in the DFS Duct are continuously monitored for mustard by ACAMS PAS 702. Three ACAMS will be used to monitor mustard exhaust gas concentrations in the DFS Duct (PAS 702a, 702b, and 702c) during the CPT. Mustard is monitored at the common stack by ACAMS PAS 707a, 707b, and 707c. For both locations, two ACAMS are online to ensure continuous monitoring of agent while the third ACAMS is in the standby mode. One ACAMS will be sampling while the second ACAMS is in the purge/analysis mode. If the ACAMS detect mustard concentrations greater than the setpoint specified in Appendix B, an AWFCO is initiated, and audio and visual alarms are activated. The DAAMS tubes will be changed hourly during the CPT, and the CAL will analyze the collected tubes.

2.13.25 DFS Exhaust Gas Flow Rate

Exhaust gas flow rates for the DFS are measured with a V-Cone® flow meter 24-FIT-9430. The flow meter is installed in the exhaust duct located after the scrubber tower and before the demister to measure the volumetric flow rate. The V-Cone® is positioned in the center of the duct to increase the velocity of the exhaust flow, which creates a differential pressure. The pressure difference is measured and converted to a scfm flow rate measurement. The DFS control system records the value and generates an HRA. If the HRA setpoint is exceeded, an AWFCO is initiated, and both audio and visual alarms are activated.

2.14 INCINERATION SYSTEM STARTUP PROCEDURES

This section discusses the startup procedures as required by 40 CFR 270.62(b)(2)(vii). The DFS is brought to full operating condition while firing natural gas before any hazardous wastes are introduced into the kiln. Full operating condition means that combustion temperatures are above the minimum for feeding waste, the DFS PAS is operational, the DFS is under vacuum, and the unit is in compliance with all regulatory limits. The startup sequence is performed in reverse order that waste feed and combustion products pass through the system. The PAS is started first and the waste feed systems are started last. The utilities and control systems must be operational before any of the DFS processing equipment can be started. The typical time required for startup from a cold system will be about 40 hours.

A summary of the DFS startup procedures is presented in the following paragraphs.

2.14.1 Startup Utilities

The successful startup of the utility systems includes the following steps, conducted in order:

1. Provide electrical power to the main switchgear, the motor control centers, and the Control Room.
2. Place the Uninterruptible Power Supply (UPS) in operating mode.
3. Place the emergency power generator in stand-by mode.
4. Start all PLCs associated with DFS operation.
5. Start the plant and instrument air systems.
6. Start the fuel gas system.
7. Start the process water system.
8. Start the caustic system.
9. Ensure that at least one Brine surge tank has sufficient freeboard for sustained operations.
10. Perform a pre-operational check of all systems to be used.

2.14.2 Startup of the DFS PAS

The successful startup of the DFS PAS will follow this sequence:

1. Perform and check, as applicable, the following:
 - a. Check that the quench tower sump is empty, any debris left from earlier operations is removed, and all manways are securely in place.
 - b. Check that caustic is lined up to provide Brine and clean liquor pH control.
 - c. Confirm that Brine and clean liquor densities are at acceptable values. If not, add process water to the system and drain to a Brine surge tank as necessary to achieve an acceptable density.
 - d. Confirm that the scrubber tower sump level is within acceptable limits.
 - e. Confirm that the DFS Duct Isolation Valve (16-XV-862) is closed if the AFB temperature is $< 1500^{\circ}\text{F}$.
 - f. Remove the bleed air damper cover.
 - g. Check that the exhaust blower lube oil system is operating and that oil temperature is acceptable.
 - h. Verify that the ACAMS and DAAMS are online.

- i. Verify that agent concentration in the furnace room is less than the setpoint.
 - j. Verify, from 16-AISH-011, that there are no fuel gas leaks in the DFS Room.
2. Start the PAS, as follows:
- a. Confirm that the demister water return pump is lined up to the scrubber tower sump, and that the demister sump level is controlled to setpoint.
 - b. Start the Brine and clean liquor pumps; adjust flow rates, as necessary; and confirm the availability of the spare pumps.
 - c. Start the exhaust blower.

2.14.3 Startup of the DFS

The DFS startup steps are as follows:

- 1. Line up valves, including fuel gas, instrument air, process water, plant air, secondary cooling water, hydraulics, Decon, and lube oil.
- 2. Line up switches for remote operation, and close all blast gates and doors.
- 3. Place furnace control screens in AUTO. The combustion air blowers start if the PAS is normal. The PLC drives combustion air dampers, and shroud air dampers open if the system is not purged.
- 4. Once valves are fully open and minimum purge airflow is established, the DFS Burner Management System (BMS) purge timer, set for 8 minutes, starts.
- 5. Once the BMS timer times out, the kiln purge timer starts, and the AFB combustion air valves are driven to the low-fire position. The PLC drives the combustion air dampers to low-fire and the shroud air dampers to their setpoint when the kiln purge is complete.
- 6. When system purge is complete, initiate AFB light off. The burner light off is not automatically initiated by the PLC. Instead, the operator must toggle each control screen, burner start switch from the Control Room. The PLC then initiates the following Fireye ignition sequence:
 - a. The Fireye checks to verify that safety interlocks are satisfied, which includes ensuring that running interlocks are made and fuel block valves are closed.
 - b. If system purge is complete, the Fireye starts the internal, 60-second purge timer. When complete, the ignition sequence continues.
 - c. The Fireye verifies low-fire position of the combustion air and fuel gas valves.

- d. The Fireye energizes the burner igniter, opens the pilot fuel gas for pilot-burner trial for ignition, and proves flame presence within 10 seconds by means of the flame scanner. If the flame is not verified, burner lockout occurs.
 - e. If the pilot flame is verified, the Fireye energizes the main fuel gas safety-shutoff valves for the main burner ignition trial. After 10 seconds, the Fireye closes the pilot and fuel-gas valve, de-energizes the igniter, and continues to scan the flame. If flame is lost at any time, burner lockout occurs.
 - f. The Fireye sends a signal to the PLC to resume control of the air and fuel control valves that are in automatic mode.
 - g. The PLC holds the air and fuel gas control valves at the low-fire position for 30 minutes to heat the burner block.
7. Install a setpoint into the AFB temperature controller. The PLC ramps up AFB temperature at a rate of 100 °F/hr until the temperature reaches 1,200 °F. The AFB temperature is held at 1,200 °F for 8 hours to heat the AFB refractory. The PLC ramps up the AFB temperature at 150 °F/hr until the temperature reaches the set point.
 8. When the AFB temperature reaches 1,500 °F, the PLC automatically starts the kiln, lube-oil pump, HDC heaters, and kiln oscillation.
 9. There are two conditions to consider during HDC startup: waste on the conveyor and no waste on the conveyor.
 - a. In automatic mode, the PLC assumes waste is on the conveyor. The heaters are on and the conveyor starts when the HDC temperature (both upper and lower thermocouples) reaches 1,010 °F. If the temperature drops below 1,000 °F (either the upper or lower thermocouple) after the conveyor has reached normal operating temperature (above 1,010 °F), the conveyor drive motor and the HDC residence timer will be stopped by the PLC. Both the HDC drive and HDC residence timer restart when the HDC temperature again reaches 1,010 °F. This ensures that HDC residues are properly processed for 15 minutes at 1,000 °F.
 - b. The PLC determines if there is waste on the conveyor at startup. The Control Room Operator (CRO) starts the conveyor drive motor in manual, or fast speed if no waste was present. The CRO places the drive motor in automatic after the HDC temperature reaches 1,010 °F. This allows the conveyor to heat more evenly, and minimizes thermal stress in the conveyor as it heats up.
 10. When the AFB temperature reaches 1,850 °F, the operator may toggle the control screen kiln burner start switch and initiate the Fireye ignition sequence. The combustion air blower is running and the combustion air valve is set to the low-fire position. The following steps are followed by the Fireye to light the kiln burner:

- a. The Fireye checks to verify that safety interlocks are satisfied, which includes ensuring that running interlocks are made and fuel block valves are closed.
- b. When the kiln purge is complete, the Fireye starts the internal, 60-second purge timer. When complete, the ignition sequence continues.
- c. The Fireye verifies low-fire position of the combustion air and fuel gas valves.
- d. The Fireye energizes the burner igniter, opens the pilot fuel gas for pilot-burner trial for ignition, and verifies flame presence within 10 seconds by means of the flame scanner. If the flame is not verified, burner lockout occurs.
- e. If the kiln pilot flame is verified, the Fireye energizes the main fuel gas safety-shutoff valves for main burner ignition trial. After 10 seconds, the Fireye closes the pilot fuel gas valve, de-energizes the igniter, and continues to scan the flame. If flame is lost at any time, burner lockout occurs.
- f. The Fireye sends a signal to the PLC to resume control of the air and fuel control valves in automatic mode.
- g. The PLC holds the air and fuel-gas control valves at the low-fire position for 30 minutes to heat the burner block.

After the Fireye finishes its steps, the operator will:

11. Insert a setpoint (1,100 °F for munitions) into the kiln temperature controller. The PLC ramps up the kiln temperature at a rate of 100 °F/hr until the temperature reaches 500 °F. Kiln temperature is held at 500 °F for 6 hours. Finally, the PLC ramps up the kiln temperature to normal operating temperature at a rate of 100 °F/hr.
12. Activate the feed chutes and kiln exhaust quench sprays by inserting temperature setpoints of 240 °F and 1,525 °F, respectively.
13. Send a command to run the kiln in forward (unless feed is initiated) after the kiln reaches normal operating temperature.

3.0 SAMPLING AND ANALYSIS PROCEDURES

The sampling and analysis objectives for the TOCDF DFS CPT are to demonstrate that:

- CO emissions are controlled to:
 - < 100 ppm, @ 7 % O₂, on an HRA basis (Title V Permit and MACT Limit); and
 - < 4.84 pounds/hour (lb/hr) (Title V Permit limit).
- PM emissions are:
 - < 29.7 mg/dscm @ 7 % O₂ (MACT limit);
 - < 0.02 grains/dscf @ 7 % O₂ (Title V Permit limit); and
 - < 2.55 lb/hr (Title V Permit limit).
- The PCDD/PCDF emissions are less than 0.40 ng 2,3,7,8-TCDD TEQ/dscm @ 7% O₂.
- The HCl/Cl₂ emissions are < 32 ppm @ 7% O₂.
- The SO₂ emission rates are below the Title V limit of 1.0 lb/hr.
- Metals emissions comply with the MACT limits.

Only one test condition will be required to fulfill the CPT objectives. The sampling and analysis procedures included in this section were selected to accomplish the objectives discussed above. Detailed information on the sampling and analysis methods are provided in the QAPP, and reference to the QAPP will be made to prevent duplication of text. The QAPP for the DFS CPT is included in Appendix A.

3.1 EXHAUST GAS SAMPLING LOCATIONS

Samples collected will be limited to exhaust gas samples, which will be collected in the DFS Duct. These samples will include samples collected using three EPA sampling trains, ACAMS, DAAMS, and the CEMS.

The DFS, MPF, LIC1, and LIC2 share a common stack. This arrangement requires that the samples used to verify the performance of each furnace system be collected in the duct between the DFS ID fan and the common stack (DFS Duct). The parameters to be measured at this location include mustard, CO, CO₂, O₂, PM, PCDDs/PCDFs, SO₂, metals, Cl₂, and HCl. Table 3-1 lists the exhaust gas sampling methods to be used for the CPT, and Figure 3-1 presents the arrangement of the DFS sampling ports.

TABLE 3-1. DFS EXHAUST GAS SAMPLING SUMMARY
DFS CPT Plan

SAMPLING TRAIN	ANALYSES PERFORMED	LOCATION	PURPOSE
Method 1	Traverse Points	Each Port	Report Information
Each Isokinetic Train	Exhaust Gas Velocity	Isokinetic Trains	Report Information
Each Isokinetic Train	Exhaust Gas Moisture	Isokinetic Trains	Report Information
Method 0023A	PCDDs & PCDFs	Ports N3 and N4	Report Information
Method 5/26A	PM, HCl, & Cl ₂	Ports J and I	Report Information
Method 29	Metals Emission	Ports J and I	Report Information
ACAMS	Mustard	Common Stack	AWFCO and Report Information
DAAMS	Mustard	Common Stack	Agent Confirmation/ Report Information
ACAMS	Mustard	DFS Duct ACAMS Port	Stop Feed and Report Information
DAAMS	Mustard	DFS Duct DAAMS Port	Report Information
CEMS	O ₂ , CO	DFS Duct CEMS Port	AWFCOs and Report Information
CEMS	SO ₂ , CO ₂ , gas molecular weight	Ports N1 and N2	Report Information

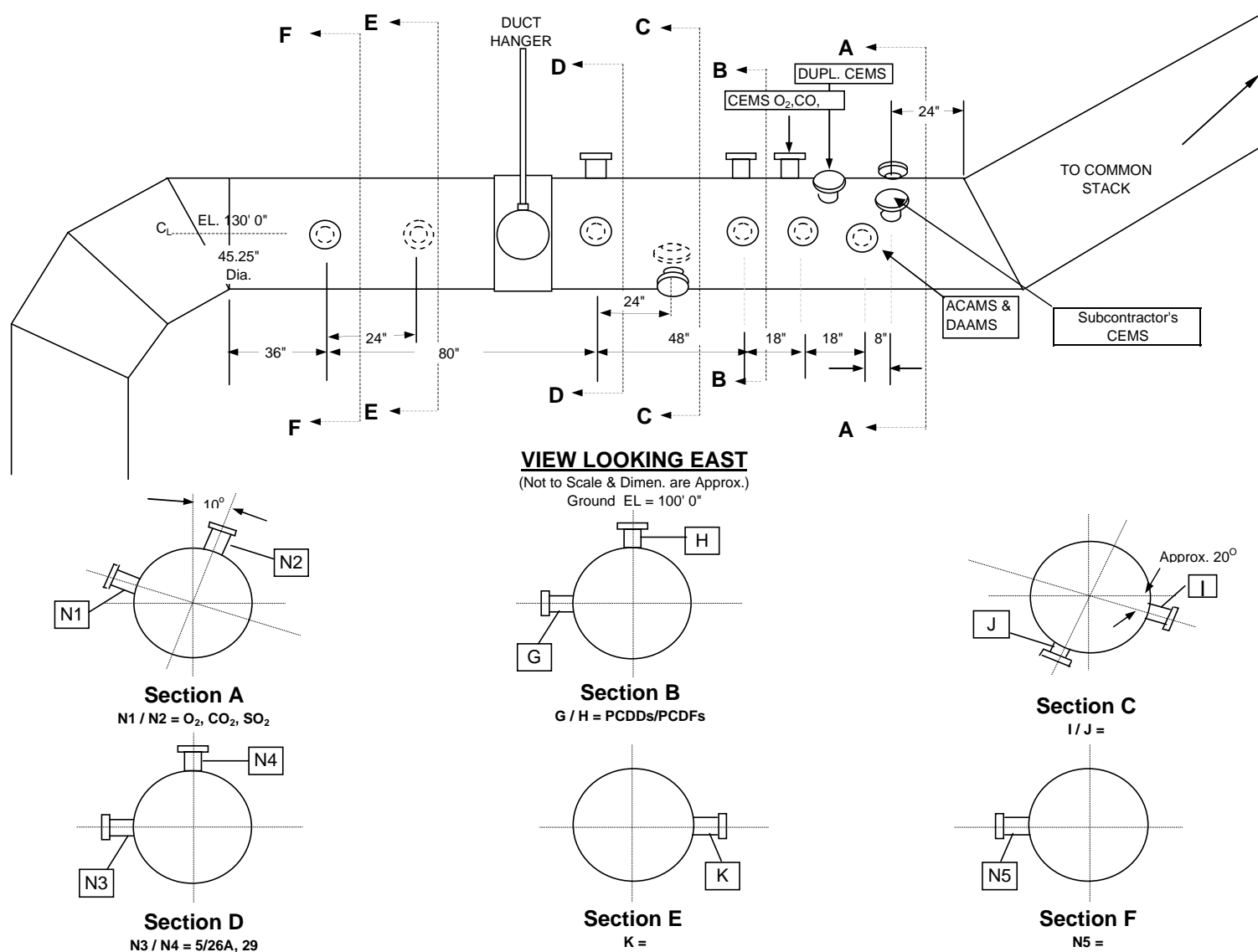


Figure 3-1. DFS Duct Sampling Port Locations

Mustard is monitored at two different locations for two different purposes. The DAAMS located in the DFS Duct will be used to calculate the mustard concentrations and mustard emission rates. The ACAMS in the DFS Duct will be used as an AWFCO. The station number for the mustard monitors are PAS 702a, PAS 702b, and PAS 702c. During the CPT, there will be three ACAMS and two DAAMS stations at the DFS Duct sample location in order to sample the exhaust gas stream continuously. One ACAMS will be in the sample mode while the second ACAMS is in the analysis mode. The third ACAMS is held in reserve to replace an ACAMS if one fails. One DAAMS station will collect a sample for one hour and then the sampling will be switched to the second DAAMS station.

The second ACAMS and DAAMS location is in the common stack monitoring house. This ACAMS/DAAMS sample location is designated PAS 707 for mustard. This location is used to activate an AWFCO that stops feed to all four TOCDF incinerators. The stack monitoring station monitors the combined gases leaving all furnace systems and is a final safety monitor of the exhaust gas leaving the stack. The stack monitoring house also has three ACAMS and one DAAMS, which are recorded by PDARS.

Additional samples to be collected in the DFS Duct include three trains for sampling emission levels of PM, HCl, Cl₂, metals, and PCDDs/PCDFs. Table 3-1 lists the sampling ports associated with each analysis parameter, and the arrangements of the DFS sampling ports are presented in Figure 3-1.

3.2 EXHAUST GAS SAMPLING METHODS

The samples for each run will be collected between the time the test starts and the time the test is declared complete. The DAQ representatives will be notified of times for leak checks of sampling trains and pitot tubes, and for start of sample recovery.

3.2.1 Agent Sampling Methods

Normal operations of the ACAMS and DAAMS are covered in Appendix A. The DFS CPT will require special operating conditions for the ACAMS and DAAMS to monitor mustard concentrations. The change to the ACAMS is that three ACAMS will be sampling the exhaust gas at the DFS Duct. One ACAMS will be in standby, and the other two will be staggered so that one ACAMS is always sampling. The staggering of the ACAMS will be verified hourly.

There are also several changes in the DAAMS operation for the DFS CPT. One of the changes is that the tubes will collect samples for one hour. Another change is that two DAAMS stations will be setup on the DFS Duct: one will collect samples while the second station will have a new set of tubes installed and leak checked; when one set is complete, the second station will be started. This mode of operation will allow continuous sampling for mustard. Other changes include a QP in each set of tubes and a field blank to be analyzed with the DAAMS tube for each

run. The field blank will be transported to the sampling location, but not put in service, and act as a QC step to ensure the quality of the data.

3.2.2 Additional Exhaust Gas Sampling Methods

The exhaust gas will be monitored as outlined in Table 3-1 using CEMS and selected EPA methods sampling trains. The TOCDF CEMS will collect data on the O₂ and CO exhaust gas concentrations (see Section 2.10.1). The SO₂ and CO₂ concentrations will be monitored using a certified CEMS supplied by the sampling subcontractor. Method 6C (2) will be used to measure the SO₂ concentration and Method 3A will be used to measure the CO₂ concentration. Certification and calibration data for the sampling subcontractor's CEMS will be available after the sampling subcontractor has arrived on site and set up the instrumentation.

The EPA methods for sampling the exhaust gas will be taken from SW-846 (1) and 40 CFR 60 (2). A combined sampling train will collect samples for PM, Cl₂, and HCl emissions using a combination of Method 5 and Method 26A (2). Samples for metals used in the Human Health Risk Assessment (HHRA) will be collected using Method 29 (2), and samples for PCDDs/PCDFs will be collected using Method 0023A (1).

3.3 EXHAUST GAS ANALYSES METHODS

Detailed descriptions of the analysis methods are located in Section 9 in the QAPP located in Appendix A. Summaries of the methods used are included in this section for completeness.

Agent concentrations in the exhaust gas will be measured using the ACAMS and DAAMS as discussed in Appendix A.

Samples of the exhaust gas will be collected using three EPA sampling trains. Particulate matter concentrations will be analyzed gravimetrically by Method 5 (2). Concentrations of HCl and Cl₂ will be determined separately by analysis of the two separate impinger solutions using an ion chromatograph in accordance with Method 9057 (1). Concentrations of PCDDs/PCDFs will be determined using a high resolution gas chromatograph/high resolution mass spectrometer in accordance with Methods 0023A/8290 (1). The metal emissions will be analyzed using an inductively coupled plasma/mass spectrometer in accordance with Method 6020 (1). The mercury emissions will be analyzed using a cold vapor atomic absorption spectrometer in accordance with Method 7470A.

4.0 DFS CPT SCHEDULE

The DFS CPT is scheduled for the first quarter of 2009. This plan provides DAQ with the required 60 days notice of the intent to conduct the DFSCPT.

4.1 PERFORMANCE RUN SCHEDULE

The CPT will begin after TOCDF has received approval of the CPT Plan. The DFS CPT should span about five days. One day for setup, three days of testing, and one day for sample packaging/shipping and cleanup. However, the DFS must achieve steady-state conditions by 1400 (or 2:00 p.m.) on any given test day or the run will likely be cancelled for that day.

4.2 DURATION OF THE DFS CPT

The CPT will consist of three replicate performance runs with one run completed each day. The DFS will be fed waste by ramping up to the full feed rate before each sampling run to establish steady-state operations, and exhaust gas sampling will begin when the system has stabilized for 15 minutes. Samples will be collected for 4 hours or 2 hours plus the port change times. Figure 4-1 shows an example of the timetable for each run. The system ramp up combined with sample collection times results in a total test time of 5 hours. Assuming minimal interruption of DFS operation, the incinerator can be expected to operate on bursters for five or more hours per day for three days.

TASK	PORTS	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9
Test Crew Arrival		■								
Daily Briefing			■							
Instrument Check		■	■							
Prepare for Sampling		■	■							
System Status Check			■							
Feed to the System				■	■	■	■	■		
Start Time				■						
ACAMS/DAAMS Sampling		■	■	■	■	■	■	■		
TOCDF CEMS		■	■	■	■	■	■	■		
Subcontractor CEMS	Port N1/N2			■	■	■	■	■		
Method 0023A	Ports G & H			■	■	■	■	■		
Method 29	Ports N3 & N4			■	■	■				
Method 5/0050	Ports N3 & N5			■	■	■				
Recover Samples							■	■	■	■
Sample Storage								■	■	■
Daily Debriefing									■	■

FIGURE 4-1. DAILY SAMPLING SCHEDULE EXAMPLE FOR THE DFS CPT

5.0 DFS CPT PROTOCOLS

Operation of the DFS will be demonstrated at the normal operating conditions for processing 4.2-inch HT Mortar bursters. The DFS CPT will have three performance runs at one set of operating conditions. The following subsections discuss and describe the waste to be burned, justification for not calculating a DRE, test condition and justification for its selection, anticipated value of operating parameters specific to each test condition, waste feed rates, and total waste to be processed.

5.1 WASTE CHARACTERIZATION

The wastes to be processed in the DFS at this point in the Mustard Campaign are limited to energetic compounds from the 4.2-inch HT Mortars and the ECR maintenance residues. These wastes are characterized as D003, Reactive Characteristic waste.

5.1.1 Energetic Compounds from Mortars

The explosive wastes processed by the DFS during this testing are energetic compounds removed from 4.2-inch HT Mortars, which include the mortar fuze and the burster charge. The composition of these items is detailed in the WAP for the TOCDF RCRA Permit. The fuze is unscrewed from the mortar and removed. The burster casing is attached to the fuze and is removed with the fuze from the burster well. The burster casing is then unscrewed from the fuze, and the two items are dropped onto the feed gate for the DFS. The gate cycles, and the materials are dropped into the DFS kiln where the explosives burn.

The fuze contains an upper charge of 50 mg of explosives (33.5 % potassium chlorate, 32.2 % antimony sulfide, 28.3 % lead azide, and 5.0 % carborundum), an intermediate charge of 150 mg of lead azide, a lower charge of 70 mg of tetryl, and a relay charge of 130 mg of tetryl. The burster assembly contains 62.5 grams of tetryl contained in a steel casing. Figure 5-1 shows the structure of tetryl while Table 5-1 gives the properties.

5.1.2 ECR Maintenance Residues

The ECR maintenance residues are generated from maintenance performed on process equipment located in the ECR and housekeeping activities. Processing energetically-configured munitions results in the generation of explosive dust that accumulates in the ECR. This dust must be removed on a periodic basis to lessen the possibility of fires. A listing of ECR maintenance residues is shown in Table 1-1.

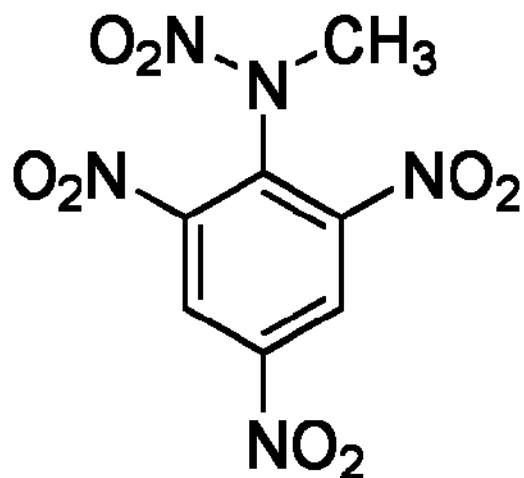


Figure 5-1. Chemical Structure of Tetryl, DFS CPT Plan

TABLE 5-1. TETRYL PROPERTIES
DFS CPT Plan

PROPERTY	VALUE
Chemical Name	2,4,6-Trinitrophenyl-N-methanimine
Chemical Formula	C ₇ H ₅ N ₅ O ₈
Molecular Weight (grams/mole)	287.15
CAS Number	479-45-8
Density (g/cm ³)	1.73
Melting Point (°C)	129.5
Explosive Temperature (°C)	187
Heat of Combustion (MJ/kg)	12.24
Solubility	Insoluble in water, soluble in organic solvents
Color	Clear-to-yellow crystals

The ECR maintenance residues will not be used as a waste feed stream during the DFS CPT. The feed rate for ECR agent-contaminated maintenance residues was set by the DFS VX ATB at 12.3 lb/hr and 10 lb/drop into the DFS. This feed rate was set from the agent feed rate demonstrated during the DFS VX ATB. The limitation is based on the conservative assumption that the entire weight of the ECR agent-contaminated maintenance residues to be charged to the DFS is from agent. The new AMR ECR residue maximum feed rate is 100 lb/hr and explosive-contaminated residues are limited to 3.6 lb/drop and the PEP feed limit (479 lb/hr).

5.2 DRE DISCUSSION

The DFS VX ATB demonstrated DREs for Agent VX and for the energetic compounds nitroglycerin and 2,4,6-trinitrotoluene. The regulations in 40 CFR 63, Subpart EEE, specify that the DRE be established during the initial CPT and further DRE demonstration is unnecessary. The Agent VX DREs ranged from 99.9999951 % to 99.9999965 %. The DRE for the energetic compounds ranged from 99.999961 % to 99.999992 %. These demonstrated DREs from the DFS VX ATB show that the DRE goals for the system were met, and further measurement of DREs is not required by the HWC MACT regulations.

5.3 TEST PROTOCOL AND OPERATING CONDITIONS

The CPT will consist of one test condition with three performance runs that will demonstrate the average kiln and AFB temperatures. The mortar bursters will be processed at a rate of 274 bursters/hr as described in Section 5.1.1. The incinerator process operating parameters associated with the DFS CPT are:

- Maximum PEP feed rate to the kiln of 38 lb/hr, which is equivalent to processing 274 bursters/hr.
- Kiln Post-Quench exhaust gas temperature range of 850 °F to 1,650 °F.
- Minimum AFB exhaust gas temperature of 2,150 °F.
- Normal quench tower and venturi scrubber Brine flows, venturi scrubber pressure drop, Brine pH, and density.
- Normal clean liquor flow rate, pH, and density.
- Mustard monitoring in the DFS Duct by an additional ACAMS.

The DFS CPT will be performed to demonstrate permit limits that accommodate the processing of energetically-configured mustard munitions found in the DCD stockpile.

The objectives of the DFS CPT are to:

- Demonstrate that HCl plus Cl₂ emission concentrations are ≤ 32 ppm as HCL equivalents corrected to 7% O₂.
- CO emissions are controlled to:
 - < 100 ppm, @ 7 % O₂, on an HRA basis (Title V Permit and MACT Limits); and
 - < 4.84 lb/hr to meet the Title V Permit limit.
- PM emissions are:
 - < 29.7 mg/dscm @ 7 % O₂ (MACT limit);
 - < 0.02 grains/dscf @ 7 % O₂ (Title V Permit limit); and
 - < 2.55 lb/hr (Title V Permit limit).
- Demonstrate average combustion gas velocity.
- Determine the PCDDs/PCDFs, HCl, Cl₂, and PM emissions in the exhaust gas.
- Demonstrate that the metals emissions meet the MACT limits.
- Establish new pH setpoints for the Brine and clean liquor solution.

5.4 COMBUSTION TEMPERATURE RANGES

The anticipated kiln temperatures for the DFS CPT will be between 850 °F and 1,650 °F as experience with the DFS indicates that the temperatures vary within this range. Kiln exhaust gas temperature is a function of waste feed rate because of the high heat content of the waste feedstock. From the time waste feed is initiated, kiln exhaust gas temperatures increase, provided the waste feed rate is sustained. Temperature fluctuations in the kiln do not result in temperature variations in the AFB, and the AFB will be operated between 2,150 °F and 2,350 °F.

5.5 WASTE FEED RATES AND QUANTITIES OF WASTES TO BE BURNED

Burster feed rates for the DFS CPT will be up to 274 bursters/hr, which is equivalent to a PEP feed rate of 38 lb/hr. Table 5-2 summarizes the requirement for bursters for the CPT, which will be 274 bursters/hr or 1,508 bursters/run. Allowing a 25 % safety factor, the CPT consumption of test feed materials is expected to be about 5,655 bursters.

TABLE 5-2. DFS WASTE FEED REQUIREMENTS
DFS CPT Plan

ACTIVITY	BURSTERS REQUIRED (number)
Ramp-up	69
Steady-State Operations, 15 minutes	69
Exhaust Gas Sampling, 5 hours	1,370
Total per Performance Run	1,508
Total,3 Performance Runs	4,524

The DFS will reach equilibrium at test conditions with the designated waste feeds supplemented by natural gas before the start of each sampling run. A surplus of designated waste feeds will be on hand in case operational problems require a longer testing period.

5.6 EXHAUST GAS VELOCITY INDICATOR

Exhaust gas velocity and volumetric flow rate will be measured during the CPT using each isokinetic sampling train (2). Details are in Appendix A, Section 6.3.4.

5.7 AUXILIARY FUEL

Natural gas will be used to maintain temperatures in both the kiln and AFB. Natural gas is also used as pilot burner fuel for both the kiln and AFB. The natural gas used at TOCDF has an average heat content of 1,043 Btu/ft³, and is 95.6 volume % methane, 2.5 volume % ethane, 0.41 volume % nitrogen, and 0.52 volume % carbon dioxide based on data from June 2005.

5.8 WASTE FEED ASH CONTENT

The ash content the 4.2-inch HT Mortar bursters is anticipated to be negligible. There is no paint on the exterior of the burster casings; therefore, the ash feed to the DFS during the CPT will be below the feed rates established during the DFS VX ATB.

5.9 ORGANIC CHLORINE CONTENT OF THE WASTE FEED

Bursters do not contain organic chlorine as an element in the energetic molecule or the anticipated impurities. Concentrations of HCl and Cl₂ in DFS emissions will be determined using Method 26A (2). Sampling and analysis details for halide emissions are in the QAPP.

5.10 METALS FEED RATES

Metals in the fuzes and bursters are very low because there is no paint on the burster casings and the energetics associated with the bursters are the primary source of metals feed to the DFS as small amounts of antimony and barium are present in the fuze energetic components (see Section 5-1). The projected metals emissions will not be a threat to human health or the environment based on the low concentrations and the demonstration that they are less than the proposed MACT limits. Metals emissions will be sampled using the Method 29 sampling train (2).

5.11 POLLUTION CONTROL EQUIPMENT OPERATIONS

Operation of the pollution control equipment is provided in this section as required by 40 CFR 270.62(b)(2)(vi). Standard operating conditions for the pollution control equipment are described in Section 2.11. The anticipated operating conditions for the DFS CPT are the same as standard operating conditions, and their limits are summarized in Appendix B. Fluctuations in PAS temperature, flow rate, pressure, pH, and density will occur during the CPT. These normal variations will be reported in the final CPT Report.

5.12 SHUTDOWN AND MALFUNCTION PLAN

The DFS CPT shutdown procedures are discussed in this section as required by 40 CFR 270.62(b)(2)(vii). The AWFCOs for Group A are continuously monitored and interlocked. The Group C parameters that are monitored and interlocked will be in operation during the DFS CPT. During the DFS CPT, the system's operation will be monitored closely by the system operators. If the operation of the system should deviate significantly from the desired range of operation or become unsafe, the operators will manually shut off waste feeds to the system.

Sampling will be stopped if an AWFCO activated during the DFS CPT lasts longer than three minutes. The residence time of wastes in the kiln is 7 minutes at a kiln rotational speed of 2 rpm. If the AWFCO condition persists for 2 hours, the DAQ representative will be consulted to determine action to be taken. The DAQ representative will also be consulted if more than three AWFCOs occur during one traverse of the 4-hour sampling trains. All actions will be documented and included in the final report.

It may be necessary to shut down the DFS and DFS PAS completely in the event of a major equipment or system failure. A shutdown of this type will be performed in strict accordance with the facility's standard operating procedures. Shutdown actions will be taken in the reverse order of the startup process described in Section 2.14. Subsystems will be shut down in this order:

1. Kiln and AFB;
2. PAS; and
3. Utilities.

Sampling will be stopped if a power failure occurs during a run. Waste feeds to the system will be stopped, but other operating parameters will be maintained to minimize emissions. Combustion air will continue to be supplied as the ID fans spin down. The DFS is equipped with an emergency ID fan that directs untreated volatilized wastes to the AFB while the kiln cools. In addition, the DFS is equipped with an isolation valve that allows the kiln exhaust duct and AFB combustion gas inlet duct to be separated should the AFB temperature fall below 1,500 °F.

5.13 INCINERATOR PERFORMANCE

Incinerator Performance is discussed in this section as required by 40 CFR 270.62(a). The TOCDF believes that the conditions specified in Section 5.3 for the CPT will be adequate to meet the performance standards of 40 CFR 63.1209 while processing fuzes and bursters from 4.2-inch HT Mortars because:

- The DFS has demonstrated the ability to incinerate Agent GB and VX Rockets at a rate of 33 rockets/hr under similar operating conditions, which indicates that the DFS can burn the expected energetic compounds.
- The DFS has demonstrated the ability to process rockets at feed rates ranging from 1 to 33 rockets/hr, which shows that the DFS AFB is capable of maintaining a constant temperature even while the kiln exhaust gas temperatures fluctuate due to differences in waste feed rates.
- The DFS has demonstrated the ability to incinerate Agent GB and VX M55 Rockets under similar operating conditions, which suggest that the HCl and PM emissions will be less than the respective performance standards.
- The range of operating conditions planned for the CPT is within the design envelope of the DFS and DFS PAS.
- The DFS and DFS PAS are tightly controlled by PLCs and AWFCO systems whenever hazardous waste is being fed to the DFS.

6.0 DFS SHAKEDOWN PROCEDURES

The DFS has been processing rockets, bursters, and mines since August 1996. Thus all DFS systems and startup testing has been previously performed. Once the approval of this plan is received from the appropriate regulatory agency, shakedown of the mortar processing equipment will commence. The main purpose of shakedown is to provide a period to run through operations of the machines that are used to disassemble the mortars and remove the energetic compounds rather than to develop an operating envelope for the DFS. This CPT is an every-5-years test to confirm that operations have not deteriorated in the DFS; it is not to establish new operating conditions for the DFS with the exception of establishing new pH setpoints for Brine and clean liquor solutions. The PEP feed rate to the DFS will be within the limits established by the DFS VX ATB, and no mustard will be fed to the DFS. During the mortar shakedown period, the entire system will be thoroughly tested to verify that it performs in a safe, consistent, and predictable manner when processing fuzes and bursters from 4.2-inch HT Mortars.

An AWFCO system function test will be performed prior to the introduction of bursters into the incinerator. The DAQ will be notified of the test time and date seven days in advance so that a representative may witness the test.

Hazardous wastes will only be fed to the system when the AWFCO system is working. The AWFCO settings during shakedown will be those specified in Appendix B, and the flow of hazardous waste to the incinerator will be stopped if operating conditions deviate from those limits. Individual AWFCOs for the parameters that may cause total incinerator shutdown (such as auxiliary fuel, burners, or ID fan) may be bypassed momentarily during routine calibrations.

6.1 STARTUP PROCEDURES

The systems will be heated until operating conditions have been reached as described in the applicable plant operations SOPs. The DFS will then be declared ready for operation, and the shakedown period will begin.

6.2 DFS SHAKEDOWN

The objectives of the shakedown are to:

- Demonstrate that the DFS can safely and efficiently destroy energetic compounds in the fuzes and bursters at the proposed feed rate.
- Evaluate the DFS conditions to ensure safe and environmentally-responsible operations.

During the shakedown phase, which will take up to 720 hours of processing, TOCDF will commence operations of all furnaces. Energetic components will be introduced into the DFS, in accordance with 40 CFR 264.344(c)(1), to bring the unit to a point of operational readiness for the CPT. The TOCDF will provide the DAQ with two-weeks' notice before introducing energetic components into the system.

6.3 POST-CPT OPERATION

The interim period between completion of the CPT and receipt of final approval from DAQ for full operating authority could be several months. During this time, TOCDF intends to continue operating the DFS on a full-time basis, operating under all federal requirements per 40 CFR 63, 264, 266, and 270. During this period, TOCDF expects the DFS to operate within the operating envelope defined and demonstrated by the DFS CPT. This CPT was conducted as a five-year test subsequent to the initial CPT conducted in July 2003, and no new operating conditions will be established by this test, with the exception of the change in the pH of the Brine and the clean liquor solution. Therefore, the feed rates will not be reduced at the conclusion of the CPT, and normal operations will continue.

The inspection plan will be followed including visual inspection of the incinerator for fugitive emissions, leaks and associated equipment spills, and signs of tampering, per 40 CFR 264.347(b). Appropriate operating records will document operating conditions.

The AWFCO system and associated alarms, as described in Section 2.9, will be functioning any time hazardous waste is introduced into the incinerator. The AWFCOs will be tested on the established schedule. Test methods for the AWFCOs will remain unchanged from the methods specified in the RCRA and Title V Permit.

6.4 INCINERATOR PERFORMANCE

The TOCDF believes that the conditions specified in Section 6.0 for the CPT and post-CPT operation will be adequate to meet the performance standards of 40 CFR 63.1209 while processing fuzes and bursters from 4.2-inch HT Mortars. The TOCDF believes that processing energetics in the DFS will be successful because:

- The DFS has successfully incinerated Agent GB and VX M55 Rockets under similar operating conditions.
- The DFS has demonstrated treating M55 rockets under similar operating conditions, which indicated that the HCl emission concentrations will be less than 32 ppm and the PM emissions concentrations less than 45.8 mg/dscm.
- The DFS PAS has undergone improvements in metals removal, and lower metals emissions are anticipated while burning mortar bursters.
- The range of operating conditions planned for the shakedown and post-CPT periods are within the design envelope of the DFS and DFS PAS, and no changes to operating conditions are proposed.
- Operations of the DFS and DFS PAS will be tightly controlled by PLCs, and the AWFCO systems will be operational whenever waste is fed to the DFS.
- The PEP, metals, and chlorine feed rates associated with the DFS mortar processing are substantially lower than the rates demonstrated by the DFS VX ATB.

Meeting the performance standards of 40 CFR 63.1209 and 264.343 ensures protection of human health and the environment.

7.0 CPT SUBSTITUTE SUBMISSIONS

This section is not applicable since a CPT will be conducted.

8.0 DFS CPT RESULTS

The results of the CPT test will be submitted in the DFS CPT Report. All data will be submitted for all analyses conducted, including the data from failed runs. The key elements that will be included in each section of the DFS CPT Report are:

- A summary of CPT results describing any unusual process conditions (i.e., deviations from the approved CPT plan) or difficulties experienced with sampling, testing, or analysis (Executive Summary).
- A discussion of any inconsistencies in the data and assessment of, or justification for, usability of the data (Executive Summary).
- A summary of conclusions concerning meeting the CPT plan objectives (Executive Summary).
- A list of key project personnel by functional position (Section 1.0).
- For each test condition, a comparison of test conditions to planned conditions for all waste feed rate information, waste generation rate information, and DFS PAS exhaust gas parameter rate information, which, at a minimum, includes (Section 3.0):
 - Maximum, minimum, average, and standard deviation of the burster feed rate.
 - Maximum, minimum, average, and standard deviation of combustion chamber temperatures.
 - Maximum, minimum, average, and standard deviation of PAS operating conditions.
 - Maximum, minimum, average, and standard deviation of exhaust gas velocity.
 - Exhaust gas concentrations of O₂, CO, and CO₂.
- A summary of test results will including the following (Section 4.0):
 - Analytical results; and
 - Exhaust gas concentrations and exhaust gas emission rates (grams per second) of metals, HCl, Cl₂, PM, and PCDDs/PCDFs.
- A description of sampling methods, sample preparation, and analytical procedures for process samples (Section 5.0).
- Example Calculations for key data (Appendix A).
- An exhaust gas sampling report with sampling equipment calibration data (Appendix B).

- PDARS data (Appendix C).
- CEMS data (Appendix D).
- A Quality Assurance/Quality Control (QA/QC) report, including a key for comparing laboratory sample identification numbers to CPT sample identification numbers and QC Criteria performance (Appendix E).
- Mustard Analyses by ACAMS and DAAMS (Appendix G).
- An analytical data package for Emission Samples (Appendix H).

The TOCDF will submit the DFS CPT Report within the 90 days following completion of the CPT. The report will be certified in accordance with the requirements of 40 CFR 270.62(b)(7-9).

9.0 FINAL OPERATING LIMITS

Appendix B lists the operating conditions for the DFS CPT and no new operating conditions will be established by the DFS CPT except the pH of the Brine and the clean liquor solution. The Appendix B tables were prepared following the hierarchy of process-control-related performance parameters, as established by EPA guidance (7). Each anticipated DFS final operating limit is listed by the process parameter and target value during the CPT. In accordance with EPA guidance, the process parameters presented in Appendix B are the same as those demonstrated in the previous DFS VX ATB; they are established in the current permit with the exception of the pH control limits for the Brine and clean liquor solutions.

The TOCDF requests approval to revise the Brine and clean liquor pH OPLs, which are established as minimum limits on an HRA basis. This change will allow TOCDF to establish, in accordance with the HWC MACT regulations, new OPLs for these parameters during the upcoming performance test. Results from this testing are proposed for use in re-establishing these OPLs, which are regulated by both the HWC MACT regulations and the TOCDF RCRA Permit.

In addition, the EPA approved an AMR to waive the requirement to establish and monitor a DFS 12-hr rolling average feed rate for mercury, ash, semi- and low-volatile metals, and chlorine as required by 40 CFR 63.1209(l), (m), (n), and (o), respectively. The approval is based on a waste feed rate of combined 4.2-inch Mortar burster/fuze pairs of 274/hr, which has been added to the OPLs in Appendix B.

10.0 REFERENCES

- (1) ***Test Methods for Evaluating Solid Waste, Physical/Chemical Methods***, 3rd Edition including Update III, USEPA, SW-846, December 1996.
- (2) Title 40, ***Code of Federal Regulations***, Part 60, Appendix A, “Test Methods.”
- (3) **Attachment 20 to the TOCDF Permit, *CEMS Monitoring Plan***, EG&G Defense Materials, Inc., TOCDF CDRL-06.
- (4) ***Hazardous Waste Combustion Unit Permitting Manual, Component 1***, “How to Review A Trial Burn Plan,” U.S. EPA, Region 6, Center for Combustion Science and Engineering, 1998.
- (5) Title 40, ***Code of Federal Regulations***, Part 60, Appendix B, “Performance Specifications.”
- (6) **Attachment 22 to the TOCDF Permit, *Agent Monitoring Plan***, EG&G Defense Materials, Inc., TOCDF CDRL 23.
- (7) ***Guidance on Setting Permit Conditions and Reporting Trial Burn Results***, EPA/625/6-89/019, January 1989.